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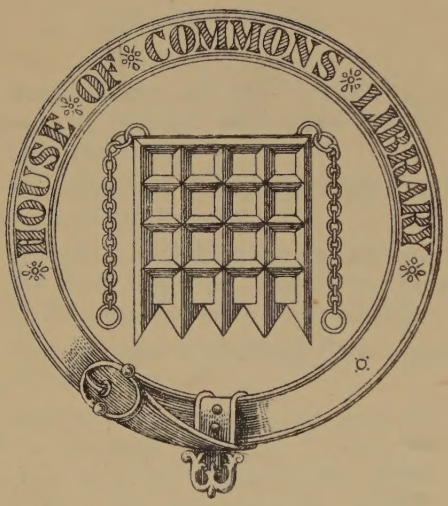

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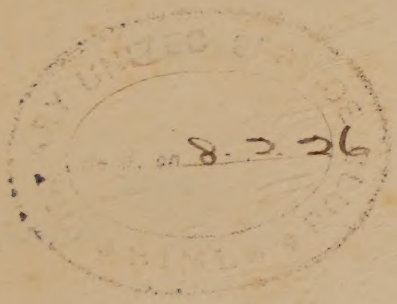
My Polar Flight

MY POLAR FLIGHT

:: BY CAPTAIN AMUNDSEN ::

WITH 45 ILLUSTRATIONS AND 2 CHARTS



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PART I

AMUNDSEN'S STORY

MY POLAR FLIGHT

PART I

AMUNDSEN'S STORY

THE day the brothers Wright rose and flew, the curtain went up on a new era in the history of mankind. Many were certain that they could see great possibilities opening up for mankind in general, and particularly for themselves in their own branch of work, but few, I think, saw such possibilities of making a full and complete change in his work as the Polar explorer. What he had tried for years to accomplish, would now be possible for him to achieve in a very short space of time.

Century after century had he worked with his primitive means, the dog—the sledge. Day after day he had exerted himself with all his craft, all his intelligence, and all his will, yet, had only covered a few miles over the vast ice desert. What courage, what tenacity had been shown in the fight against cold, hunger and hardships. What a brilliant example of sacrifice and self-denial! Year after year shut up in a tiny little ship, surrounded by the same people, equipped with only the most necessary things, he had worked up to this time through the greatest of difficulties, through the hardest tests—cold and darkness. And now, all at once, in one moment, the whole of this was to be changed.

Cold and darkness should be dispersed, becoming warmth and light instead; for the complete and troublesome journey should be changed now to a speedy flight. In truth the possibilities were great. No rationing, no hunger or thirst—only a short flight.

As in a dream, seen as a far-away possibility, there was ignited that day a small spark which was quickly to blaze up to a mighty fire and in the course of a few years become one of our most important means of communication. Emerging from its swaddling-clothes, flying freed itself, and went into its cradle when Blériot flew across the Channel. It was then speedily led by the world's war through its childhood, where it (developing with the years—slowly or quickly, who can say ?) was led into youth—into manhood! What the possibilities would become it was difficult to say, but one had to be satisfied with what was then there—flying's childhood. The young inexperienced birds leaving their nests show us an example. Some will hurt their wings, others will break them altogether, but, it is quite as certain that, just as they do, so will mankind also succeed in reaching his goal in the world of flying.

As I learned of Blériot's flight, I knew at once that the time had come to think of using the air to help the Polar expeditions. Certainly human power and skill had overcome and conquered vast tracts of this mighty unknown whiteness, but enormous tracts remained unexplored—tracts which now could be reached from the air. My thoughts turned especially to the enormous area in the Arctic which until now had withstood every attempt. Certainly Nansen, the Duke of the Abruzzi, and Peary had drawn lines through the unknown, doing great and brilliant work, but the colossal and unknown tracts still lay in front of them unexplored.

Should we have had to continue exploration in the

same old manner we should have had to wait many years before our knowledge had become complete. If one *had* used the word "impossible" it seems absolutely reasonable to have used it in connection with the exploration of this immense ice desert; but it seems that the word "impossible" has been scratched out of the dictionary of mankind. How often have we seen the impossible made possible! What was impossible yesterday is an easy matter to-day. Blériot's flight across the Channel showed me the conquering of the impossible. When I, in the year 1909, equipped the *Fram* for a trip to the Arctic, I had a conference with one of the most esteemed aviators of the day. He declared himself as willing to go with me. But it never came off, a fact which probably was for the best, as, in the case of both parties, it was put off on economical grounds. I mention this in order to draw attention to the fact that the idea of exploring the Polar regions from the air is not a recent plan. I have been attacked from many sides because I have "*stolen*" the plans of others; this seems to me childish and scarcely worth talking about, but many people take childish things for grim earnest if they have not a closer knowledge of the circumstances. Therefore, these few words.

In 1914 I managed to get sufficient means to buy my first aeroplane for use in Arctic exploration. As an independent means of transport in those vast tracts it certainly could not be used where all circumstances seemed to be against it, but, in conjunction with a mother-ship, would be of invaluable service. It was, therefore, my intention to take it on board the *Fram*, which at that time was ready to begin its journey north, and there to use it in the best possible way. What immense areas would it not be possible to observe in an Arctic trip if one only was able to rise a few thousand

yards ? By what I had seen of the ice I was certain one could always find flat places to rise from and to land on. But later experience showed me that it takes an aviator to express an opinion about landing conditions amidst Polar ice, and not an Arctic explorer. What the second considers to be a flat plateau can be absolutely useless in the opinion of the first.

My first aeroplane was a Farman biplane mounted on skis. We scarcely could have got any benefit from this. Later years' experience shows me that. The war broke out in the meantime, and put a stop to that part of my programme. But then, as so often later in life, I experienced the fact that an apparent obstacle often had the opposite effect. Flying technique at that time took enormous steps forward ; the child shot up, grew, and learned to move on its own account.

In 1921 the world's record for the longest sojourn in the air reached about twenty-seven hours, on a Junker machine in America. It was a monoplane, built entirely of aluminium, and therefore specially suitable for working in the Polar regions. Sun, cold, snow and rain would not hurt it. I was living at that time in Seattle, Washington, where the *Maud* lay, being equipped for a new journey north. As soon as that news reached me my decision was made. Such a machine I must have at all costs. With such an apparatus the impossible would become almost possible. The door to the Unknown seemed to me to be opening, but my hopes were dashed and the door remained locked for many years still. The machine at last was got and Lieutenant Omdal appointed to be its pilot. In May, 1922, we decided, as soon as we had learned to know the machine, to fly from the works in New York over America to Seattle. The engine failed as we were over the town of Marion in Pennsylvania, and we had to make an irritating forced landing in the

Oil-Fields. The machine was entirely ruined; a new one was hastily ordered, sent through America by rail just in time to be taken on board the *Maud*. Simultaneously the well-known American Curtis Aeroplane Factory put at our disposal a small reconnoitring machine. Therefore, as the *Maud* sailed in 1922 she was completely equipped, not only for a trip through the ice, but also for exploration from the air. The Curtis machine should be used for reconnoitring and accompany the *Maud* all the time. I promised myself endless results from it. Whilst the *Maud* went on right into the ice and explored sea, ice and air, Omdal and I went ashore at Wainwright on Alaska's north coast, from whence we intended to trek as far as possible into the unknown territory to the north of that coast, but everything went to pieces. On account of the stormy summer and autumn, Omdal and I could not leave the place as arranged, but must build a house and spend the winter there.

In May, 1923, we were ready for flight, but already on our first trial flight the Junker broke the whole of its underpart in landing and became so damaged that all hope of repairing it had to be abandoned. Thus we gathered no experience. Things went somewhat better, however, with the little machine on board the *Maud*. A wireless telegram announced that it had been twice in the air with Odd Dahl as pilot and Wisting as observer, but it was crushed in the landing. So far as I understand these two flights had not been of long duration; therefore it was scarcely possible to have studied anything of the immense area. It is, however, certain that these two were the first to fly over the actual drift ice. Thus we hear from them, for the first time, of the great difficulties which flying in this district presents. It was impossible from the air to determine the condition of the

ice, they said ; it appeared to be absolutely flat, but it was quite different, as results showed. The prospects now were not any brighter. On my return to Seattle I had only my two empty hands and a ruined aeroplane which nobody wanted.

I did not, however, give up, but continued to work in order to get a new equipment. 1924 had passed up till now without luck. In September of the same year I went to the Norsk Luftseiladsforening (Norwegian Air Club) and proposed that they should work with me ; I was received with open arms. Whilst they should try to do what they could at home I should travel to America to see what I could do there. I had already held some lectures on the subject, and sat one morning in my hotel deeply engrossed in reckoning out how long it would take me with my earnings to pay my creditors and start a new flight.

The result was not heartening. I found out that if nothing unforeseen happened, I should be clear by the time I was 110 years old ! But you see, the unexpected *did* happen just then ! The telephone rang and a voice said : " Are you Captain Amundsen ? " (They always called me Captain Amundsen in America, but as all the negro conductors receive the same honour it does not make me feel proud.) " Yes, I am." " Well," continued the voice, " I am Lincoln Ellsworth."

That was how I became acquainted with the man to whom I should later owe so very, very much. The Luftseiladsforening (The Air Club) will certainly agree with me when I say that without his assistance the expedition could hardly have taken place. It is not my intention by this to belittle the great and excellent work which the Club did ; in deep thankfulness will I always remember the names of the three members of the Board with whom I came into direct touch—the President,

Dr. Rolf Thommesen, and the two members, Dr. Raastad and Major Sverre. Thanks to their energetic work, together with the State's kindly aid, the expedition was soon ready to start. During my stay in America all the winter, the entire organizing of the work fell on these gentlemen, but the technical part of the arrangements fell on our expedition's second in command, First Lieutenant of the Royal Norwegian Navy Hjalmar Riiser-Larsen.

Hjalmar Riiser-Larsen had already taken part in the spring attempt to get the expedition going, so he was quite familiar with everything. It was, therefore, both with gladness and with trust that I was able to telegraph to him $85,000 — James W. Ellsworth's gift — asking him to order the two seaplanes. From this moment Riiser-Larsen got permission for leave and was able to give himself up entirely to the expedition. As a flying man he is so well known by every person in the land that it is superfluous and stupid to mention more. But he has dozens of other notable qualities which I need not enumerate and which made him specially qualified to fill the post he has. With such a second in command a difficult trip becomes for the leader a pleasant and light effort.

He was assisted in his work by the First Naval Lieutenant Leif Dietrichson and Flight Lieutenant Oskar Omdal. Both these gentlemen had been in the spring fiasco and thus knew all the details. It is quite unnecessary to talk about Dietrichson. His skill as a flyer is recognized by all. His bravery and resolution will stand out clearly later in this record. With his light outlook on life, his glad smile, and happy nature, he was an invaluable comrade on the flight. Omdal is known. If things went *with* him or *against* him it was all the same. Nothing seemed to depress him. He

stood beside me in my two unhappy attempts in 1923 and 1924, and you can believe that it took a real man to show courage and keenness in a third attempt, but Omdal did not disappoint me. "So long as *you* don't give in," he said to me, "you shall always find me ready." He is a marvellous being; he seems to have several limbs more than the rest of us. He moves slicker and thinks quicker. It is impossible to depress him. With three such men I knew that the technical part of the expedition was in the very best hands. The objective of the expedition was to trek in, as far as possible, over the unknown stretch between Spitzbergen and the Pole in order to find out what *is* there, or what *isn't* there. It was not only to substantiate evidence of land but to make a geographical research. This substantiation was as equally important as learning the composition of the land. From Nansen's, the Duke of the Abruzzi's, and Peary's discoveries, we had certainly good reason to believe that no land existed in that part of the Arctic ocean, but our knowledge must be built on *certainties*, not on *beliefs*. Modern exploration insists on certainties. How miserably our maps have suffered in this district, just on account of "beliefs." Land has been put down instead of ocean, ocean instead of land, all on account of these same "beliefs." More accidents have been caused by this than one would think; many people have lost their lives.

Apart from this we hoped to be able to make a number of meteorological observations, which, even although they would not bring us many rich scientific results, would still give us interesting enlightenment. In the end we hoped, as at first, to harvest great and rich experiences which could be to us and to others of the greatest help when we once should be ready to start for the long-arranged flight from Spitzbergen to Alaska.

Dr. Rolf Thomessen

I lay special weight on the fact that I hope our experiences will be found of use by others. I do not belong to that class of explorer who believes that the North Pole is a place for himself alone. My outlook shows that I have an absolutely opposite disposition; "the more the better," say I. Rather let all of us be at the same time at the same place. Nothing stimulates like competition, nothing encourages exploration more. How would it appear, if, for example, a man made public his intention to fly across the Polar regions, but for some unforeseen reasons could not accomplish it. Should everyone therefore stay away from the place so long as the first one was alive? It seems to me an absurdity which is little in keeping with the sporting spirit one would expect to reign in these regions. He who comes first to the mill gets his grist first milled, says an old proverb. I hope to be able to make an attempt to fly from Spitzbergen to Alaska next summer. I must not, however, declare this to be my private ground; but I wish, on the contrary, that many will go there too. All the experience which I have stands at their disposal.

The trend of a wireless telegram from Dr. Sverdrup on the *Maud* in the summer of 1924 intimated that large tracts of land were not likely to be found north of Alaska. This theory, he has based, after careful tide-observations. I have great faith in Sverdrup; I have never met a cleverer man than he, in his own line, but I feel absolutely certain that he will agree with me that one should go further in and explore the place. Without having actually seen it one cannot substantiate the evidence.

Our hope to get right along to the Pole was very small, for *that*, our radius of action was too limited. Apart from that I had not any great interest in reaching

the Pole, as I had always regarded Peary as being the first on the spot. Our objective was only, therefore, to cover the great distance by flying over it and over the great area we were exploring.

On the 9th April all the long and many preparations were finished, and we left Tromsö at five in the morning. The expedition had two ships. The motor ship *Hobby*, which should bring the two seaplanes up to Spitzbergen, and the Navy's transport ship *Farm*, which the State had placed at our disposal for the undertaking. On board the *Hobby* were Riiser-Larsen, Dietrichson, Omdal, Berge the photographer, and the Rolls-Royce mechanic Green.

On board the *Farm*, Captain Hagerup, the second in command Lieutenant Torkeldsen, ice-pilot Ness, Dr. Matheson, Director of the Pisaverkene Schulte-Frohlinde, with two mechanics Feucht and Zinsmayer, the journalists Ramm and Wharton, the meteorologist Dr. Bjerknes, the guide Calwagen, also Devold, the cook Olsen, sailmaker Rönne, Horgen, the chemist Zapffe, Lincoln Ellsworth and myself. This may appear almost unbelievable, but that part of the journey was regarded by us as one of the most anxious. It was still early in the year, and the fairway between Norway and Spitzbergen was everything but safe for two smacks like ours. The *Farm* is a midsummer boat, intended for an ice-free sea, sunny and calm. But in the month of April one must not reckon with these three factors. One would be much cleverer to expect lots of ice, no sun, and heavy storms, and for that the *Farm* is not a suitable ship. The *Hobby* was more of an ice-ship and would in general plough her way as well as any other, but this was an extraordinary occasion. The tremendous cases which the flying boats were packed in, had no other place to lie but on deck, and in consequence of this the *Hobby* became

in very truth not much of a sea ship. The ubiquitous prophet had foretold her death and her sinking, and I must say that I was almost inclined to agree with him when I saw the big boxes lifted in the air. After leaving Tromsö the *Hobby* had already given up trying to be a boat; she looked like a mass of gigantic cases which were wandering along over the sea.

The arrangements were that both ships should keep together in order to be of mutual assistance and cheer. It is always comforting in the loneliness of the sea to be cheered by the near presence of another ship; assistance, too, we might both have need of.

It was a dark, unpleasant night as we left Tromsö—wet and black. A foreign film photographer, who accompanied us to Spitzbergen, showed his spirit by operating his camera, under all conditions, and filming for all he was worth. (Had he wished to take a film of a dark night he must in very truth have been lucky.) Just outside Skaarö Sound we got into tremendous snow-storms and the meteorologists at the same time announced that the storm centre was in the west. I decided along with the *Farm's* Captain Hagerup that it would be advisable to go into Skaarö Sound, anchor there and wait. The meteorologists thought that the bad weather would be of short duration. We signalled to the *Hobby*: "We shall anchor at Skaarö," after which we steered towards land. We lost the *Hobby* in a snow shower. At 11.45 a.m. we anchored and expected the *Hobby* to arrive soon. Frequent blasts amidst thick snow-falls made the atmosphere impenetrable. We waited in vain for our comrade.

At four p.m. the storm centre passed and we set off again. We passed close to Fugleö, peering and glancing into all the creeks and inlets looking for the *Hobby*; but there was nothing to be seen. We

understood, therefore, that she must have misread our signal and steered in a direct course for Björneöen.

In spite of the officers' and the men's unchanging kindness and willingness the journey was not altogether pleasant. We were packed as tightly together as it was in any way possible to pack human beings, and then as the boat began to roll, so the air got thicker and thicker—I refer to the inside air—and what under normal conditions would have been perpendicularly hanging things, such as towels, coats, etc., all stood right out from the wall in such a way that people began to feel themselves a little uncomfortable. I say uncomfortable, for nobody would ever be sea-sick! Now I have been at sea for over thirty years, but I have yet to meet the person who will admit to being sea-sick. Oh no, not at all!—sea-sick?—far from it: only a little uncomfortable in the stomach or the head. In my diary I believe I have written that there were a number of sea-sick people on board, but I ask all the people to excuse me if I have been mistaken! I am also so very frank in my diary that I remark that I, too, am not so sure of myself, but that remark was presumably only meant for my private eye. The night of the 10th was particularly unpleasant. Zapffe, Ellsworth and I lay in the dining-room. Zapffe reclined in a corner of the sofa looking very pale, but insisting that he had never felt better in his life. Ellsworth and I lay in our sleeping-bags, and judging from the sounds and movements I heard and saw I should be bold enough to say that we were in the same condition of well-being as Zapffe. Everything that could tear itself free did so; the chairs in particular appeared to have taken full possession of the dining saloon; the tricks they performed during the night were absolutely unbelievable. Now and again they performed alone, now and again they united and

performed in troops. They had also been joined by a box of cigars which fell down and performed with them, and I can remember how these cigars flew round our ears. In spite of his paleness Zapffe had not lost his good humour. "I thought I was in Havana," came calm and dry from him as the first cargo of cigars struck him. I asked him if he would not be satisfied with Bremen, but that he would not agree to at all. In the pantry which lay beside the saloon there seemed to be a veritable and forcible Jazz band now playing. Which instrument was being used at the moment was not quite clear to me, but in any case a zinc bucket was certainly doing its best. The rolling calmed down on the following day and most of the "souls" showed themselves on deck, with a pale, sleepy look in their faces. I asked one who seemed in a bad way if he had been sea-sick, but I should never have done that. With cold scorn he replied that he had never felt such a thing in his life. What he felt half a minute later when a sudden roll landed him between two boxes and deprived him of the last part of his breakfast I don't know. Certainly not sea-sick!

It is astonishing to notice how people's interests can change in one moment. Yesterday we went round Tromsö and not the finest drug store, or the most tempting grocery shop, or the best set-out shoemaker's window would have made us turn our heads to look at them. But this afternoon one of the members of the expedition had opened a box, which he had kept standing on the afterdeck, apparently with a view to taking something out. In a second he was surrounded by a curious crowd. The object of interest felt himself particularly flattered by so much notice being taken of him and he took out one thing after another. First came a tube of tooth paste. All necks were stretched, each one longer than

the other, to get a sight of the wonderful thing. After that came a tablet of chocolate. What comments this brought forth I am unable to say as my point of observation was so far away. Certain it is, however, that the interest in the chocolate was quite intense. A pair of shoes came next. Had they been new and fine, I could have understood it. But that anybody could show interest in these old, worn, down-trodden shoes is to me unbelievable. A snow-storm closed the entertainment.

Word came that Björneöen was free from ice and we could approach without fear of meeting any. At four o'clock in the morning of the 11th we passed the island's most southerly point. We had built on the possibility of seeing the *Hobby* there, but in vain. We sent Björneöen a wireless and asked them to keep a look-out for the *Hobby* and to inform us immediately if they sighted her. Simultaneously we telegraphed to King's Bay and asked them for information regarding the ice conditions there. Beside the island we ran into a south-easterly wind which during the day developed into a fresh breeze. At five o'clock in the afternoon we came into small ice, but, steering a westerly course, got quickly clear of it. On the 12th we passed through some fields of mush and quite small ice. The *Farm* is far from being an ideal ship for ice navigation, but so well did Captain Hagerup and Ice Pilot Ness guide us through, in such a careful and comfortable manner, that they earned our fullest appreciation. A less worthy man could have sent a boat such as the *Farm* to the bottom in much less ice than we passed through. The atmosphere was impenetrable during most of the day. At ten o'clock in the evening—in a little clear glow—land was discernible. It was Quade Hoock in King's Bay. At two o'clock we arrived at the edge of the ice and moored fast to it. The *Knut Skaaluren*, a little steamboat, which had brought the

two Directors, Brandal and Knutsen, here, lay there already.

King's Bay had been free from ice the whole winter. Only in the last two days had the ice acquired a temperature of −26° C. We naturally regarded this as a great misfortune, as it seemed that we should be prevented from getting in to the Coal Company's quay, where we were to begin the unloading of our boats. So far from being a misfortune, this proved itself later to be our first and greatest piece of luck that King's Bay was ice-bound.

At ten o'clock in the morning I went ashore in order to pay the Directors a visit to see what they could do for us. The distance from where we had moored the *Farm* up to the quayside was a good three miles ; there was a lot of water on the ice, dark and mushy. It was not easy to see Ny Aalesund, which was snow-covered. But the moment I arrived at the quay and climbed from the ice a hand was stretched out giving me a warm handshake and a cheery welcome. It was Director M. Knutsen, who, with the Company's other Director, was to show us the most glorious hospitality during the whole of our long stay in King's Bay. I may as well say it now as later, that without these practical men's assistance, we could scarcely have brought our arrangements to completion as they eventually were.

It was soon fixed up that all who were participating in the expedition should come ashore and stay there, where room must be found for them. Where there is room in the heart there is room in the house, they said. Nothing greater than the "heart room" of Knutsen and Brandal could anyone ever wish to find.

Now there was a matter which weighed on my mind—depressing me in a high degree. Where was the *Hobby ?* I went on board the *Farm* at eventide and walked up

and down on the deck. It was about seven o'clock at eventide when Horgen came up to me and said that he saw something which stood high above the ice, and according to his opinion, only the *Hobby* could present such an appearance. Up with the glasses! Yes! quite right, there came a heavy-looking box rustling and crushing through the ice. The *Hobby* itself I could not see even now, but I *could* see that there was life on board. Everyone ran around and shouted "*Hobby* comes, *Hobby* comes." In a second all hands were called on deck, and to the accompaniment of ringing hurrahs the *Hobby* lay by the side of the ice. All was well on board. The first part of the journey was over. Our boats were safely in King's Bay. Honour where honour is due, and it should be given to the expedition's airmen, Captain Holm, Pilot Johannesen, and the whole of the *Hobby's* crew. It was no small act of seamanship which they had accomplished.

The next day was very wintry—sea fog with a temperature – 10° C. We took advantage of this for the members of the expedition to flit ashore and make themselves at home in the Coal Company's station. The airmen—Riiser-Larsen, Dietrichson, Horgen, Omdal, in company with Ellsworth and Ramm, got their own cosy little house. Zapffe and I were quartered in the Directors' house and the others in the hospital. The sailing-boat workshop was cleared and prepared as a dining-room. This was baptized "the salon." Here the sceptre was waved by our steward, purser, chemist, and purveyor of entertainments. Yes, dear steward, you won all hearts with your glad, happy spirit. To me you were an invaluable and priceless aid with your dutiful and conscientious work.

The newly frozen ice, which prevented us from approaching the quay, might have become embarrassing

had not Captain Jensen, of the *Skaaluren*, on the 15th April, become tired of waiting, and decided to make an attempt to force it. The attempt was crowned with success in the highest degree. Never, I believe, has the *Skaaluren* been so absolutely astonished at herself. She broke through very quickly and lay a short time afterwards by the quay. The *Farm* and the *Hobby* followed behind her in line, and by the evening we all lay alongside the quay. There we had a northerly breeze of about – 13° C. Midwinter!

By the following day everyone was fully occupied taking our belongings ashore. Riiser-Larsen organized the work with the frequent assistance of his comrades and the officers from the *Hobby*. At this point I would like to hand out a few compliments to the crew of the *Farm*. When and where they could help, they were always at hand. Quick, skilful and willing at all times. Fortunately the ice here was so strong that one could discharge the sea-planes on to it. This was a great help and lightened the work considerably. Everybody at the same time hauled them along a natural slide towards land and placed them outside the station-workshop, where all the necessary help was obtainable.

Director Schulte-Frohlinde, from the Pisa Works, with his two mechanics Feucht and Zinsmayer, along with Omdal and the Rolls-Royce mechanic Green, who had got the very worst job, remained in charge. In spite of snow and cold they continued "hard at it" from morning until evening without anyone ever hearing them grumble once; but they were men of steel!

It was gratifying to see how the machines grew from day to day. Frohlinde believed that he could have them completed by the 2nd of May, and it very nearly proved so. There was another duty which had

to be carried out each day under the same difficult conditions and with the same unabated energy. This was the weather report service. No matter how it blew, no matter how it snowed, nor how bitterly cold it was, Bjerknes and Calwagen were always on the go. Nothing seemed to tire these two young scientists, and the expedition owes them the greatest gratitude for their splendid work. They were assisted in their work by Devold, who was principally employed receiving messages from the numerous stations in Europe, Canada, Alaska and Siberia. The weather report service is still in its swaddling-clothes, but there is no doubt that in time it will become a strong factor in our progress. Already we could see the benefit to be derived from this particular service by any expedition, whether it should go north, south, east or west.

Others of our "most occupied" men were the photographer Berge and the journalist Ramm. The first of these two could always be seen with his camera in his hand and his tripod on his shoulder. He was everywhere. One could not even blow his nose without Berge being there to immortalize the event. Ramm kept the world advised of the expedition's progress; if we did anything, it was immediately telegraphed. If we did not do anything, it was likewise immediately telegraphed. His strongest competitors were the meteorologists; not that they were giving news to the world's press in competition with Ramm. No, they did not do that, but they were in frequent use of the wireless. Between the two parties there arose a burning question as to which was the more important—the weather reports or the news reports. The meteorologists voted for the weather, Ramm for the news. And so it remained. Doctor Matheson acted as the *Farm's* and the expedition's doctor. As a doctor he fortunately did not get much to

do, but it seemed safe and comforting to know that he was near if anything should happen.

I now come to the expedition's "*most* occupied" man. That was my old travelling companion from the *Fram* and the *Maud* trips—Sailmaker Rönne. Since he first joined my service for the *Fram* expedition in 1910—fifteen years ago—any weakening in his work was undiscernible by me. In view of what he did on this trip one could only come to the conclusion that he had improved. He was the first man up every single morning, and in full swing long before anyone else. But it was quite necessary for him to do this if he was to complete in good time all the little orders which came streaming in to him every day in large numbers. At one moment he was sewing shoes, soon afterwards trousers ; then tents and sleeping-bags. He worked at the boats and made the sledges ship-shape. His strongest *forte* was to bring along with him everything that other people had forgotten. If anything was missing anyone could be absolutely sure that Rönne would be able to help him out of the difficulty. His greatest service at this time was, that during the flight to the North, he gave me a long knife made from an old bayonet which was to prove our best ice-tool. It was during our last dinner in the "salon" that he came to me and honoured me with the knife. I had a splendid clasp knife already, but accepted his gift in order not to offend him. I intended to lay it away in one or other of my lockers as it was too big to carry about. But how it happened I cannot say—the knife appeared in my rucksack and was of invaluable use to us later. Ton after ton of ice has been shifted by my comrades and myself with this same knife. When I travel next time I shall at least have a dozen with me.

Our cook, Einer Olsen, could prepare a rum omelette, —now I must not let my tongue run away with me—

just as well as any chef in the best hotel of any seaside resort, and that is not saying enough. Apart from this he absolutely astonished us with what he called *gâteau danois* (Olsen was a linguist). I sought in vain, from the point of view of a baker, to analyse this confection, but without success. The nearest I can describe it as, is a cross between a cream bun and a *gâteau de mille feuilles*. *He* got up still earlier in the morning than Rönne, and thus deprived him of his record-breaking honour.

Our stay in King's Bay began really with the baptism of the " Salon." That was on Sunday, April 19th. The furniture of the " salon " was quite different from what it originally had been. Its contents were composed of a long board and four trestles. In addition to this, and on account of the shortage of room elsewhere, it was necessary for the " salon " to house the pantry. This stood beside the entrance. A little gramophone supplied us with all the *Jazz* we desired. In addition to this it could play music ! But what was missing in the way of furniture in the " salon " was made up for by the culinary masterpieces. And here competition was strengthened by originality. Yes, there were even a few who risked saying that—— No, I won't repeat it, as one says so many things. On the evening of the christening there were twenty-six people round the table. I see by my diary that the number was legion, but my diary *has* to be discreet, so it keeps silent about the rest.

There is nothing particular to relate about the days which followed. One followed the other just exactly as ordained by the almanack. Some (yes, the most) were beautifully sunny, and beautifully coloured from the magnificent glaciers. Others were overshadowed with fog and snow. The day in the week which we looked forward to with the most pleasure was not Sunday, as you might be inclined to believe, but Friday. Every

AMUNDSEN AND RIISER-LARSEN ON BOARD.

Friday at 5.30 p.m. there was a steam-bath ; a proper, really good steam-bath. There was nothing mean about the heat in this as we had coal all around us ; wherever we went, and wherever we stood. It was far meaner as regards the quantity of water, but we did not bother about that. The bath was naturally very popular. In the morning the ladies had their turn ; in the afternoon the Directors with their staff, along with the members of the expedition. Saturday was bath day for the miners.

Over and above this a very important piece of work had to be done in these days, *i.e.*, getting the provisions and equipment ready for the flight. In case it should interest anybody I will here repeat my list exactly as it appeared :

PROVISIONS.

per man per day.

Salt Beef	400 gr.
Chocolate	250 gr.
Biscuits	125 gr.
Dried milk	100 gr.
Malted milk	125 gr.
Total	1,000 gr. = kg.

RUCKSACK.

1 change, diary, compass, matches, tinder, housewife, snow glasses, cup and spoon, pipe and tobacco, linen thread, sail-cloth, gloves, 1 pair ski-shoes, 1 long knife, 1 pair skis, 2 staves, 1 pole, 1 sleeping-bag.

EQUIPMENT PRINCIPALLY FOR THE MACHINES.

1 boat, 1 sledge, 1 tent, 1 medicine case, 1 Primus, petroleum, reserve belts, 1 Meta cooking stove with plates, 2 sextants, 1 level, navigating equipment, 6 small and 4 large smoke bombs, 1 cooking pot, motor spare parts, tools, 2 snow shovels, 1 ice anchor, 1 log, 1 sun compass, 1 pair of glasses, tent plugs, meteorological instruments, 1 shot gun, 1 rifle, 400 cartridges, Colt

revolver, 25 shots, senna grass, benzine pump, hose and bucket, camera, films and plates, soldering lamp.

On the 29th of April the *Farm* attempted to go to Green Harbour to fetch and take the mail. However, she did not get far before the ice stopped her. By dinner-time the next day she had returned.

Ellsworth and I now went every day to the wireless station in order to take the time signal from the Eiffel Tower, so that we might check our watches. We had each three watches for use on the flight. Fortunately they never went wrong. We checked the time signals for fourteen days before our departure and thus we were absolutely certain of the correctness of our watches.

On the 4th of May, a strange, restless and unsettling sort of day, we began to long for the moment when we could leave. The meteorologists announced that, *that* particular morning would be a fine opportunity to go and we were not long in replying "All is ready." The *Farm* and *Hobby* got orders to make ready to sail northwards, and all hands were called on deck to help to get everything in order. In the meantime a north-easterly wind got up and retarded the mechanics from completing the final little finishing-off touches. We were therefore compelled to put off our intended start until the weather improved. In the meantime the boats made ready, and on the next evening—5th May—the *Farm* and *Hobby* steered northwards in order to reconnoitre round the Danske Öen, to see if they could find a good place for us to start off from, on the ice. That evening we had −18° C. No work could be done. On the 6th we received a wireless from the *Farm* from South Gate which announced that the weather was very uncertain and that we ought to wait. They announced also that they had found no suitable starting-place on the ice. The

ice all around was uneven and banked up, and consequently useless for our purpose.

After the machines were ready to start we saw clearly that the maximum weight of 2,600 kg. which the Factory said we could carry was going to be considerably increased. We could see that if we had to make the flight we must at least carry 3,000 kg.—perhaps more. The two pilots Riiser-Larsen and Dietrichson thought that it would be quite possible to rise with this from the ice. Director Schulte-Frohlinde doubted the possibility. The two former, however, had great experience in rising from the ice and my trust in them was complete. To rise from the water with this weight would hardly have been possible. On the eighth evening the *Hobby* came back, announcing that the ice conditions were bad, the weather was stormy and the temperature as low as −23° C. We decided, therefore, to wait some time, hoping for an improvement in the weather and a more reasonable temperature.

On the 9th, N.25 left its "cradle" on Spitzbergen for the first time, and made a few trial runs on the ice. Everything went well and the pilot was very satisfied. On the morning of the 11th the *Farm* returned, thus finishing this part. Now we were all ready to make use of the first opportunity which the meteorologists should advise. The temperature rose quickly and steadily, and in the days that followed it was quite clear that spring was coming.

The 17th of May dawned and was spent exactly as it should have been. A salute in the morning. Olympic games, and a gala dinner in the evening in the "salon." On the 18th, Dr. Bjerknes announced that the prospects were so good that we should hold ourselves ready for a flight at short notice. We were ready. The weather on the 19th was still not exactly as the prophet wished

it to be. In the meantime, however, we made "All clear" and got the machines down to a definite starting-place where one could slide down a grade direct on to the fjord ice. Local bad weather on the 20th prevented us from starting. The filling of the petrol tanks was finished and by eventide we were absolutely ready.

As I, on the morning of the 20th of May, stuck my nose out of the window, I realized at once without further confirmation from our weather prophets that our day had arrived. It was brilliant summer weather with a tiny breeze blowing from the fjord, exactly what the pilot wished for. The starting time was fixed for 4 p.m. The sun was in a favourable position for our sun compass and gave us the greatest aid on our flight. Even at breakfast time we could notice that there was a little excitement in the camp. Many of the members of the expedition, who otherwise would still have been invisible during the time I usually took my breakfast, had in this case already breakfasted and disappeared. It was unnecessary to send a messenger round to say the day had dawned. Everyone was making his preparations for departure and the different members could be seen with hands full of private belongings to disappear beside the machines and to return empty-handed. Each of these little journeys brought more weight, and by the time the last pin was fastened we were carrying a load of 3,100 kg., or about 500 kg. more than we were supposed to carry. Director Frohlinde had always insisted in his opinion that we ought to make some trial trips. The airmen said "No." As the differences of opinions will be disentangled later on I shall not say more about this here. All the morning a crowd of people were crossing over to the starting-place. Everybody who could be there was on the spot. Dinner was taken in the "salon," and if some one had come in by chance, he

would have noticed something unusual going on. The only guests we had in the "salon" were six thermos flasks, set up ready for the road. These contained chocolate; beside them were our only provisions for the flight, and the box of Mrs. Clausen's good oatcakes. The only person who disturbed the dinner's quiet and friendly course was the steward, who thought he ought to wish his comrades a good journey and thank them for assembling there. Thus was the last dinner at an end and the "salon" again took on its old form as the Coal Company's sailing-boat works. *Sic transit gloria mundi.*

As I left my good and comfortable quarters in the house of the Director, his good-natured housekeeper Berta stood there with two packets which she held out to me: "There is one for each machine," she said. "Just a little 'snack' for the journey." Oh, Berta, could you but see how gladly and with what warm thanks in our hearts we took the delicious sandwiches and eggs, carefully and slowly from the packages; eating them with pleasure as our last civilized meal, for a long time to come—you would certainly be overjoyed!

At three o'clock in the afternoon we were all gathered beside the machines. As I have already remarked—one is never ready. Director Frohlinde went round and looked carefully at everything. Green, the Rolls-Royce mechanic, listens first to the one and then to the other of the motors. At four o'clock all four motors were warming up. It was a sign for all of us that our hour was almost there. Both sun compasses, which had been set at four o'clock, started going at the same time as the motors had started humming. Whilst we put on our heavy flying clothes the two flying men and observers did likewise, wearing similar garments—thick under-clothes of wool with leather on top. The point which I personally had always been afraid of during a flight was

the condition of my legs. The tremendous speed, which necessarily causes a strong draught and lowers the temperature, puts our shoes naturally to a very strong test. It was not often that my experience proved of actual use to me, but this time I really did some good out of it. On my earlier journeys it had often been necessary for me to stand hour after hour as observer. When the temperature is between – 50° C. and – 60° C., which often happened, one must have very special footwear. I found out then that one ought to have good warm footwear on, preferably loose leather stockings and leather shoes (such as the Eskimos wear), and in addition to this, the feet should be put into enormous canvas shoes, filled with senna grass, which forms a complete lining to the shoes and renders protection to the feet. That time, years ago, we had taken no Eskimo shoes, but used felt shoes with a pair of thin stockings, and above these we wore gigantic canvas shoes filled with large quantities of senna grass. The result was brilliant. Not only were we far from freezing, but one or two grumbled because they were too warm. The pilots wore thick leather gloves which gave complete protection to their hands. Personally I wore only an old pair of woollen gloves as I had to write continually. The mechanics were not so heavily clad, as they were continually on the move, passing between the petrol store and the motor, and for this reason they *had* to be lightly clad. As soon as we were dressed the various members took their places. Ellsworth and I were in the observation seats. Riiser-Larsen and Dietrichson were in the pilots' seats, and the two mechanics, Feucht and Omdal, were beside the motors. My place was in the observation seat of N.25, which lay forward. In the seat behind me—the pilot's seat—was Riiser-Larsen, and in the petrol store behind him was Feucht. In N.24 the arrangements were the

Feucht Before, During and After the Flight

same for Ellsworth, Dietrichson, and Omdal. Feucht, who had accompanied Director Schulte-Frohlinde from Pisa, was only taken on as a member of the expedition a few days before the start ; he had up to that time remained in the Factory's service. He is a German by birth, and had been employed by the Factory for a long time, being considered an exceptionally capable man, which will be proved here later. Everyone was now ready to say good-bye and a long queue passed by the machines. Mention of the photographer must not be forgotten, either, in this connection.

Whilst we waited, the motors continued to run, and the clock went round to five. Before the two planes got away the following orders were sent out : (1) The command of the remaining part of the expedition should be taken over by Captain Hagerup of the *Farm*. (2) In 14 days from the start the expedition's return by flying machine might be expected. The *Farm* and *Hobby* should remain together in the fairway by the Danske Öen so long as it was possible to see the north coast. Should the light diminish the *Hobby* must steer towards the east as far as conditions allowed, but not east of Verlegen Hook. (3) After 14 days had passed the *Hobby* was in every event to steer eastwards, if possible as far as Nordkap. After collaborating with the *Farm* they were to take up the work of patrolling as near the edge of the ice as possible, both ships keeping a sharp look-out. (4) From the 16th to the 19th of May, the *Farm* shall remain in King's Bay for boiler survey. (5) The ships (if necessary the *Hobby* doing this alone should the *Farm* have gone back earlier) shall remain by the north coast of Spitzbergen and continue patrolling for six weeks counting from the start ; the *Hobby* going afterwards to King's Bay to collect the remaining material to be delivered at Tromsö, where it will be sent back in accordance with special instructions

here enclosed. The dispatching will be attended to by the chemist Zapffe. (6) When the *Farm* goes to King's Bay for boiler survey it will give those members of the expedition who wish it, the opportunity to accompany the boat to King's Bay in order to travel home by the first opportunity. (From here Horgen, Ramm and Berge are the first to return when both boats definitely set off.)

First Lieutenant E. Horgen, who was engaged as the expedition's reserve airman (after he had obtained permission from the Norwegian American Line where he was first mate), became the expedition's leader on board the *Hobby*. The services Horgen rendered us were many and valuable. I would have liked so much to have granted his great wish to fly northwards with us, but there was no room. Next time I hope to see Horgen an active participator in the flight. He belongs absolutely to the type which I have always sought for—calm, resolute, and afraid of nothing. As a flyer Horgen is now counted amongst the best.

It was now ten minutes past five. The motors were quite warm and Green nodded approvingly. His smile expressed complete satisfaction. A last handshake from Director Knutsen and then good-bye. The motor was running at top speed as N.25 trembled and shook. The plan was that our machine should make the first start. First to try if possible to start out over the fjord with the wind in order to glide and swing at a low altitude between the fjord boundaries. If this were not successful we were to set our course direct against the wind, towards King's Bay. It was also agreed that the machines should try to keep together during the entire flight. What the one did the other should do afterwards. One last pull and then N.25 was free and glided gracefully down the slide on to the frozen fjord. The trip was started. "Welcome back to-morrow," was the last I heard as

N. 25 above Oslofjord.

with tremendous speed—1,800 revolutions a minute—it set off towards the starting-place in the middle of the fjord. There we noticed all at once that the ice was bending right over and the water surging up. In a second the machine was across the fjord, heading straight for the glacier and making 2,000 revolutions. This was one of the most anxious moments. Could the machine bear the tremendous excess weight or must we stop and lighten it ? The pilot sat at the wheel. Had he been seated at the breakfast-table he could scarcely have looked less concerned. As the speed still continued, and we were nearing the glacier at a mighty rate, the pilot's coolness seemed greater than ever. His mouth was the only indication of his resolution and determination. We went over the ice like a hurricane. The speed continued and continued ; then, suddenly the miracle happened. With a mighty pull the machine raised itself from the earth. We were in the air. The master-stroke was accomplished. It seemed to me after the breathless anxiety that I at last heard a light " Ah ! " which grew into a ringing shout of joy.

After this calmness again took possession of the man who had performed this master-stroke, and it left him no more during the whole trip. Feucht was always going up and down between the tank compartment and the motor ; his duty was to keep the pilot advised of everything : how the engine worked : how much petrol had been used, etc. All seemed in the finest order and Feucht announced " All clear." Before we rose I had tried to get my things in order as the space was limited and my belongings numerous.

Over Cape Mitra we had already risen to 400m. and everything beneath us seemed exceedingly small. Time after time I turned round and looked for the other machine, but never managed to discern it. Therefore we

turned our plane completely round, flying back to look for N.24. One never knew what might have happened. It was possible that something had struck it as it tried to rise. The ice might have broken, or its load might have been too heavy for it. Suddenly something blazed in the sun; it glittered like gold. It was the sun playing on N.24's wings. There it came in full flight to meet us. Everything seemed to be in order. Had I known then what I know now I should have held my breath for a moment and taken off my hat to the man who sat at the wheel. But more about that later. Then the machine turned its nose again towards the north, and the two enormous birds started their flight together towards the "Unknown."

My feelings at that moment were one whirl of burning gratitude. I gave a bow and a grateful glance to the man sitting behind me who had accomplished this brilliant master-stroke—a warm, silent thank-you to those who had just joined us; a thank-you so deep and so heartfelt to my five comrades, who have all willingly placed their lives upon the scales—a thank-you because the heavy yoke was at last lifted from my shoulders (the disdainful scorn which I had been forced to feel so many times during the last year of constant misfortune had disappeared for ever). Even if we fell right down now where we were this proof of our earnestness could never more be taken away.

We passed quickly over the north-west coast of Spitzbergen, where the sea below us was entirely free from ice. Then we reached Magdalena Bay, the South Gate with the Moss Islands, and then came the Danske Öen. I knew them all again from my trip with Gjoa in 1901. After an hour's flight we were level with the Amsterdam Islands. Here we met most unpleasant weather. Fog as thick as porridge. First it came densely, thickeningly

from the north-east—then thicker—thicker. The pilot rose higher and we were flying above the woollen blanket. The other machine accompanied us at a somewhat lower altitude. Here I saw the strangest optical illusion I have ever seen, and nothing seems to me to have ever equalled it in beauty. Directly pictured in the fog I could see a complete reflection of our own machine surrounded by a halo of all the spectrum's colours. The sight was miraculously beautiful and original.

We took our bearings from the Amsterdam Islands and steered north for Taakeheimen. Here the fog came down quite unexpectedly. We had not looked for it so quickly, nor such a big stretch of it; it was certainly not local, but a field of colossal dimensions lay before us. For two complete hours we flew over it; a stretch of fully 200 kilometres. Occasionally we passed over a little break or hole in it, but never big enough to give me an opportunity to take my bearings. These holes were of great interest. Through them I got an idea of the territory below. The sea here was filled with small ice with water amongst it. These conditions continued to 82° n.br., and I am certain that a vessel with any power at all could have navigated it. A little after eight o'clock it began suddenly to clear, and in a second the fog disappeared as though charmed. And there below us and in front of us lay the great shining plain of the notorious pack-ice.—"How many misfortunes have you been responsible for during the passage of years, you vast Whiteness? What have you not seen in the way of need and misery? And you have also met those who set their foot upon your neck and brought you to your knees. Can you remember Nansen and Johansen? Can you remember the Duke of the Abruzzi? Can you remember Peary? Can you remember how they crossed over you and how you put obstacles in their

way? But they brought you to your knees. You must respect these heroes. But what have you done with the numbers who sought to free themselves from your embrace in vain. What have you done with the many proud ships which were steered direct towards your heart never to be seen again? What have you done with them, I ask? No clue, no sign—only the vast white waste."

Quite naturally an airman's thoughts turn towards a landing-place. Should his motor fail and he has no place to land, he is indeed in a bad way. But no matter where we looked there was not the sign of a landing-place. So far as we could see the ice looked like a number of furrows, stretched out without rhyme or reason, and between the furrows rose a high stone fence. Conditions, however, were unusual, the fence took up more room than the ploughed field. Had the field been even and flat it would not have appeared so strange, but a flat part simply did not exist. The plough seemed to have been everywhere between stones and stubble. A little brook was also there, but so small that one could have jumped over it anywhere. A more monotonous territory it had never been my lot to see. Not the slightest change. Had I not been engaged in making many kind of observations and notes it is certain that the uniformity of the outlook and the monotony of the engine's hum would have sent me to sleep, but fortunately my task kept me awake. Riiser-Larsen confessed to me later that he had had a little snooze. I can understand that, as he had monotonous work to do.

The mean temperature during the flight had been −13°C. N.24 kept beside us with no thought of separating. I tried continually to take the sun, but unsuccessfully. The sun was all right, but the horizon was useless. Our plane level was fastened to the sextant (a bulb

sextant, of American make). We had used it several times at a trial in King's Bay, but the results were most unsatisfactory, so much so that we had stopped using it. Therefore I was left to use whatever Nature placed at my disposal. But Nature was not obliging. There was no horizon. Sky and ice blended into one.

Two hours after I had taken soundings at the Amsterdam Islands I got an opportunity to calculate our speed and the deviation. What had happened in two hours? It was exceedingly difficult to say. If one does not get an opportunity to calculate the speed and the deviation it is naturally difficult to know the direction of the wind when one comes flying at a speed of 150 kilometres. The sky was quite clear as we came out of the fog with a few high cirri in the east. About ten o'clock a fine mist crept up from the north, but too high and fine to annoy one. The sun was not quite visible, but from the sun's position and the compass's variations it was quite clear that we were well over to the west. There was, therefore, nothing else to do but to steer eastwards. I have never seen anything more deserted and forlorn; at least I thought we might see a bear or something to break the monotony a little, but No—absolutely nothing living. Had I been sure of this condition before I would have taken a flea with me in order to have life near.

At five o'clock in the morning of the 22nd we came to the first waterway. It was not a small brook, but a big dam with arms stretching in different directions. It offered our first possibility of finding a landing-place. According to our bearings we should now be in 88° N. Lat., but with regard to longitude we were quite confused. That we were westerly was certain, but where? Feucht announced here that half the petrol was used, so it became necessary to look for a landing-place. Our intention was, therefore, to descend, take the necessary

observations, and act in the best way according to the conditions. The question now was where should we land? Naturally a landing on the water would have been safest, so far as the landing was concerned, but there was always the fear that the ice might close in and crush us before we were able to rise again. We decided unanimously that if it were possible we should land on the ice. In order to observe the territory as conveniently as possible we descended in big spirals. During these manœuvres the aft motor began to misfire and changed the whole situation. Instead of choosing a place now we would have to take what offered. The machine was much too heavy to remain in the air with one motor. A forced landing became necessary. At this low altitude we could not reach the main dam, but had to be satisfied with the nearest arm. It was not particularly inviting—full of slush and small ice. But we had no choice. Under such conditions it was worth much to have a cool, unruffled pilot who never lost his self-possession, but even in flight was able to make a clear decision and act accordingly. The slightest wobbling and the game would have been lost. The arm was just wide enough for the machine, so it was not so dangerous. Every clump of ice could have torn it through; the danger lay in the high icebanks which lay at each side. It took a master to guide the machine in between these and save the wings. We landed squat in the slush, and here arose the most difficult problem any airman could have to solve. It was a piece of luck for us that we landed in the slush, for that slowed down our speed somewhat. But on the other hand it reduced the boat's manœuvring powers. We were passing a small iceberg on the right. The machine turned to the left, with the result that the wings stroked the top of the iceberg and loose snow was whirled in the air. Here

AMUNDSEN BEFORE, DURING AND AFTER THE FLIGHT

we zig-zagged along in a manner which was most impressive and alarming. Could we clear it ? The anxiety was great for those who were only spectators ; it seemed not to have the slightest effect on the pilot ; he was quite cool and calm. When I say we cleared the iceberg by two millimetres it is no exaggeration. I expected every moment to see the left wing destroyed. The speed now slackened in the thick slush, and we stopped at the end of the arm—nose up against the iceberg. It was again a question of millimetres. A little more speed and the nose would have been stove in.

So far so good. We had still our lives—what did this place look like ? The arm ended in a little pool surrounded by high icebergs, and with nose against this we lay with our tail towards the entrance. We hopped on to the ice and looked around. What was to be done ? Only one thing. To try and get out as quickly as possible. Should the ice freeze together we were sentenced to death in five minutes. What was necessary now was to turn the machine round 180°. I must say we put all our force into the work and tried in different ways, but all in vain. The slush and small ice stuck fast to the boat and it lay as if in glue. If we managed to free the boat a few inches the slush went with it. If we got rid of that, the boat fell back into its old position, and then, so did the slush. Oh, how we struggled and strove. But after the space of a few hours we had to put that plan aside and take on another. But first we must find out where we were. Our observations gave 87° 43′ N. Lat. and 10° 20′ W. Long. Our presumption that there was a westerly current was proved to be correct.

At 8 a.m. we decided we had earned a little food and rest. But before we could gratify this need there were two things to be done. First to take all the provisions and equipment on to the big ice, in case

the ice should begin to screw. Also we must look around to see if our comrades on N.24 were in sight. The small quantity of provisions that we had were shifted on to the ice in a few minutes, and then we set off with glasses to take observations from the top of the highest icebank. We thought we had heard a shot after we had landed, but we were not certain. There are so many noises like shots amongst the ice. The last I saw of N.24 just before our landing was that it was flying very low on the other side of the dam. If I was right we must look for it in a southerly direction, but everywhere we looked there was nothing to be seen. The mist now lay somewhat lower than when we landed, and a few snowflakes came whirling along. The temperature was about −15° C. I had never looked upon our machine before as a dwelling, but that must be done now. It was divided into five rooms. The first, the observer's room, was too small for occupation. No. 2, the pilot's place, offered the best sleeping-room for one or two men. No. 3, the petrol store, was full of tanks and could not be used. Room No. 4 was the best of them and we decided to make it a dining-room and sleeping-room. It was four metres long, diminishing afterwards towards the tail. I presume that the builder had never thought of it as a dining-room when he built it, but certain it is that it seemed absolutely prepared for that purpose. At all times our Primus apparatus got a good position here. Room No. 5 lay right in the tail, and you entered it through a round door in the wall. It was long, small and dark, as it had no window. As a bedroom for one man it might have been used had it not been for the ribs which converged tightly here. In the "dining-room" we set our Primus going, and soon had our first meal of chocolate and biscuits. It was comfortable in here so long as we could keep it warm, and this was easy in the beginning, while we still trusted

and hoped that our stay should be short. We had brought with us some small petrol apparatus—called Therm'x, and with these we kept the temperature fine and high.

I cannot pass by our friend Therm'x without giving it a good word. How it is constructed I cannot say, and it will not interest many. But what will interest most people is the fact that, with one litre of petrol this apparatus will give out considerable heat for twelve hours. In addition to this, it is absolutely fireproof. It gives a glowing heat, but burns without a flame. You could pour petrol over it whilst it functioned, yet nothing would result except smoke and an unpleasant smell. For a trip like ours where we were surrounded by petrol it was a priceless possession. Add to this its astonishing economy and it is not necessary to say more. Two Therm'x's made each room quite cosy, but as events will show even Therm'x had afterwards to be used sparingly and our cosy corners were cosy no longer. Riiser-Larsen, unselfish as ever, took up his quarters in the tail. How he managed to bear four weeks in it puzzles me. He must still bear five blue stripes exactly like the five tail ribs! Feucht had his place in the dining-room, and I mine in the pilot's room. We did not rest long at first, for at 10 o'clock we were in full swing again. We tried once more to turn the machine round, but soon gave it up for another plan, namely, to get the machine into safety as quickly as possible, for without any warning the fissure might close up and crush us like a nut between nut-crackers. To guard against this we decided to place it on top of the iceberg which lay beside us. It seemed a hopeless task at first, but it meant so much. Firstly, part of the iceberg must come down for a slide to be made. "But, however could we accomplish that task?" asked one. Yes, that is the question. When we left we had

500 kilos too much on board, and therefore must deny ourselves many things. To carry with us a number of ice tools which we might never need was out of the question. We had only calculated with landing on, and rising from, suitable ice. No one had dreamed of the present situation. We looked at our available tools : three slip knives ; one big knife ; one axe ; one ice-anchor which in time of need could be used as a pick. It is unbelievable what people can do when they are driven to it. There was only one way to get the machine into safety—and for that the iceberg must come down and be levelled, and it would appear that we only had our fingers to do it with. Wholly inexperienced in work of this kind, we were rather clumsy in the beginning, but we were willing and incredibly persevering and were lucky enough to get the better of the situation. Later we managed to level an iceberg in a fabulously short time, but at present we were unused to the work and it went slowly. From time to time during our work, we went up to the top of the machine, or to the top of an iceberg, and looked around to find the others. It was possible that anything might have happened in such a morass, and at lunch time we discussed the various probabilities. Had they made a bad landing ? Had they decided it was hopeless to land at all in this chaos ?

The next day we got ready to march to Cape Columbia. The sledge was secured and put ready, so that with the shortest possible warning we could set off, if the ice should close in and crush the machine. Our provisions were sufficient to last for a month, giving 1 kilo per man per day. As soon as we saw our situation was serious we began quickly to take less and in a short time our ration was reduced to 300 grammes per day. It was naturally too little for any length of time, but, for a shorter period, would suffice. We all felt very weak

after the first day, but it appeared that we could get used to it. We got noticeably thinner, tightening our belts every day. My belt, which had often been too tight in King's Bay, was now too slack even when worn outside my thick leather clothes. Our sleeping equipment consisted of one light reindeer-skin bag, only designed for summer use. Most of us grumbled at the cold in the beginning, as the temperature remained about – 10° C., but one must have practice in using a sleeping-bag, and one must understand it in order to pass in it what turns out to be a warm balmy night, while another person without experience freezes. It is necessary to take plenty of time and to work oneself right down to the bottom when getting into a sleeping-bag, for one can often see people who have no knowledge of these things only halfway wriggled in, and naturally they pass an uncomfortable night.

On the 23rd we were able to cross the new frozen ice into the pool. We were early at work that day and kept on hacking at the slide. During a little interval I took the glasses, climbed to the top of the machine in order to look round after N.24. Who can describe my pleasure as I, almost with the first glance, observed it, to the south-west, on the other side of the great dam, where it lay looking quite cheeky. A little to the left stood the tent. And still a little further away, on the top of a high iceberg, a flag. This was pleasant news for my comrades and in haste we hoisted our flag. Anxiously I followed progress through my glasses to see if they were observing us. Yes, right enough, in a few moments I saw signs of life. They sprang to the flag, caught hold of it, and in a few moments we had a means of communication, as fortunately our two pilots were practised signallers. The distance between us was too great for semaphoring, so we had to use the Morse system. Apart from the

fact that it took a little longer, everything went splendidly. Dietrichson announced that his machine on leaving King's Bay had started an ugly leak, but that he had hoped all the same to be able to manage. We could tell them that our machine was absolutely undamaged. No further announcements were made. We went on with our work on the slide all day.

The 24th was given up to the same work. Most of the ice was as hard as flint and it took us a long time to work through it. In the afternoon I discovered suddenly through my glasses that there was an unusual stir on the other side. I could see them jumping backwards and forwards, preparing to do something or other. An hour later they put skis on ; slung two heavy packages on their backs and set off towards us. It was just what I had wished to happen, though I had not expressed my wish so long as they were working at their machine. If they were able, by some means, to get their boat clear for a start, I naturally had no desire to hinder them. We could well have done with their assistance in our work of saving our machine, but, so long as they had their own work to do, we could not ask for help. I watched them anxiously through the glasses, noting their mode of approach through the icebergs (let me make it clear that they had very heavy packages on their backs), and I did not like the direction they took. They set their course directly towards the new frozen ice in the dam, and I doubted its solidity. Certainly the ice in the little fissure was strong enough, but the ice on the great dam was a different matter. I held my breath as they descended from the old ice towards the new. Things could go wrong and prove fatal. Fortunately they were sufficiently foresighted to stay on the old ice ; to my relief they kept to it, coming straight across and throwing off their packages. I thought they were going to rest

a few moments, but was pleasantly surprised when they produced two flags and started semaphoring. It was not long before Riiser-Larsen was also on the job, and the conversation started. They told us that they could not get their machine clear away alone and asked if they should come over and join us. As they apparently intended to cross the new ice, we hastily answered that it was better for them to turn back and consider matters a little, arranging to continue semaphoring the next morning at 10 o'clock. With a sigh of relief I saw them go on to the old ice again.

On May 25th we managed to get our machine on to the slide, so that the heavy end lay on the old ice. This was a great advantage, as any screwing which might take place would only push us higher up into complete safety. At 10 o'clock the next morning we semaphored again. Dietrichson announced that conditions were better over there. In reply we asked them, if they were finished with their work, to come and help us. I would rather have seen them set off immediately, but such a course would have hindered their own work. While we chatted a big seal head suddenly appeared from a little fissure. I was astonished. Seal in 88° N. Lat. I had not expected to find.

With a satisfied feeling we drank our chocolate that evening. Our condition was so much better. If we were not in absolute safety, we still had found a way to work clear. Our stay in the waterway had been a nightmare. High icebergs grinned down on us the whole time.

The 26th was a busy day. It dawned overshadowed ; with a temperature of −10° C. The ice on both sides of the great dam had been moving a good deal during the night, and both machines were driven nearer each other. We could thus quite easily see everything that happened

in the other camp. We worked as usual on the slide and hoped in course of the day to raise the machine absolutely. At 3 p.m. there was great excitement on the other side and we thought at once that they were crossing to us. The great dam had become considerably smaller during the night; we looked at the old ice with large round eyes as we saw the people from N.24 coming round it towards us. We thought that they would have a dreary march of several hours, so we got on with our work in the meantime.

Who can describe my surprise when someone suddenly said, "Look, there they are!" Twenty minutes after leaving their resting-place they had nearly reached us. Two hundred yards away we could see them working their way between the icebergs. We knew, however, that they could not come straight over, as there was a little fissure lying between us and them. Riiser-Larsen and I left our work, took the canvas boat, and went to meet them. We had scarcely set the boat on the water when Riiser-Larsen got into it to cross and fetch one of the advancing party. As he broke his way through the thin ice, I stood on the old ice and waited, when I was alarmed by a ringing shriek—a shriek which went to my marrow and made my hair stand up on end. It was followed by a number of cries, each one more alarming and terrifying than the last. I had not the slightest doubt but that a drama of the most horrible kind was being played on the other side of the iceberg. A man was in danger of drowning. There I must stand and listen to it without being able to raise a finger to help him. The situation seemed hopeless. The dying cries got less, and I thought to myself: "Yes, now all is over. How many of them and who?" Just then came a head from the back of the iceberg. "Fortunately all three are not drowned." One appeared and then another one

joined him ; then all three were there. To say I was glad is a mild expression. The two first shook themselves like dogs, but the third conducted himself normally. Riiser-Larsen carried them quickly over the fissure. Dietrichson and Omdal were wet to the skin, but Ellsworth was dry. We got them quickly on board the boat and their wet clothes were changed for dry ones.

To burn in the Primus stove, I had been clever enough to bring spirits of wine with me, and smiled slyly to myself over my farsightedness. As they arrived their teeth chattered so that they could not speak, a fact which was quite understandable, as falling in icy water and having to remain in a temperature of −10° C. for ten minutes afterwards, while a fresh little breeze is blowing, is enough to freeze one's marrow. A dram of 97 p.c. possibly saved them from unpleasant consequences. A cup of steaming chocolate performed wonders, but *it* took twenty minutes to get ready, while the dram was ready at once. The work at eventide was stopped and we gathered in the little dining-room to hear each other's news. As the three left their camp at 3 p.m. with their packages of 40 kilos. weight, they had fastened lifebelts on and put skis on their feet without fastening the lashings. When they found that the old ice was difficult to negotiate on account of small open cracks, they decided it would be better to link hands and cross the new ice. The result was better than one might have expected, and they got safely near to the old ice. But that lay on *our* side, and in such a condition that they preferred to continue on the new ice. Omdal went first, then Dietrichson and last Ellsworth. The first to break through was Dietrichson, in fact one could hardly use the word " break," as " *sink* " suits the situation better. The slush is very treacherous ; it disappears underneath without a sound. When Dietrichson

fell through he quite reasonably gave a loud cry, and Omdal turned round to see what was wrong. In the same moment he himself fell through, and both lay there. Without a thought, and with brilliant presence of mind, Ellsworth rushed to them, pulled Dietrichson out and together they ran to Omdal. It was in the last moment that they reached him, loosened his rucksack, and hauled him out. He had stuck his nails into the ice and held on with the greatest desperation, but it did not help him much as the current carried his legs under the ice and threatened to draw him under if help had not come to him in the last moment. Lincoln Ellsworth was later decorated with the medal for bravery by H.M. the King of Norway, and no one who wears it has earned it more bravely. There is no doubt that by his action he saved the whole expedition, as later experience showed us, for without the power of six men the N.25 could never have got home.

And now we got Dietrichson's story of his departure from King's Bay. Notwithstanding the fact that he knew a large part of the bonnet had been torn open he decided to continue the flight in order not to restrain N.25, which was already in the air. He thought it was better to risk life than to stop the trip. I know there are people who will shrug their shoulders and say: "Idiotic." I take off my hat, and say, "Courage—splendid, brilliant, indomitable courage. Oh! if only we had a number of such men."

When N.24 saw us land they prepared to follow suit, but as Dietrichson knew that the water would surge in as soon as he came down, he sought a landing-place on the old ice whence he thought he could raise his machine. To land on it he found was impossible, but he managed to land half-wise on the old ice and thereby saved the situation. A quantity of the material

they had carried got wet, and everything was hung out to dry. It sounds strange to speak of drying things in −10° C., but when they were hung on the dark grey wall of the machine they did not take long.

From this moment all six of us took up quarters on board the N.25. Dietrichson and Omdal went into the mess with Feucht, Ellsworth in the pilot's room with me. It was not a wonderful place that we had, but in 80° N. Lat. one is not so particular. The three in the mess must each evening lay skis on the floor in order to have something to lie on.

On the 24th of May the six of us finished the work of bringing the machine into safety. How lightly and pleasantly it went now that we were all together. The thought of what might have happened to the others had often proved detrimental to progress. Now we worked on amidst laughter and song, and no one could have believed that we were prisoners in Nature's most solid prison. In the beginning we three had only had one goal before us, namely, to raise N.25 on to the nearest solid ice. The slide was ready, but until the others joined us we had not managed to raise the machine. Now we broadened our plans, arranging to bring the machine on to a floe which we had examined and discovered to be safe and solid. In order to reach it it was necessary to get the machine across an intermediate floe. To do this we found it would be necessary to negotiate some small icebergs and unevennesses, and to fill up two ditches or trenches two metres wide. Our first work, therefore, was to get the machine on the slide. What we three had found difficult was easy for six men to accomplish ; it was not only the addition of physical power, but also the knowledge that we were reunited, and it seemed that nothing could stop us as the machine glided on to the first floe. We were all pleased and satisfied. We

believed we could make great progress in this frame of mind. How hopeless much of this work appeared to be when we started, but self-confidence and unity quickly changed the prospects. Riiser-Larsen was a builder of bridges and roads. He seemed to have done no other kind of work in all his life than what he was doing now. The two holes were filled up, the whole place was evened out, and at 8 p.m., to the sound of loud "Hurrahs," we glided on to the thick solid floe, where we felt absolutely safe; or as safe as we could. Casting the lead the following day gave us 3,750 metres. Adding to this the fact that we had reached 88° 30′ N. Lat. when we landed, I believe that we confirmed Peary's observations that no land exists in the northern sector of the Arctic Ocean. But this cannot be absolutely decided until someone flies over. The evening of the 29th the dam closed considerably and the distance now between the two boats could scarcely be more than 1 kilo. as the crow flies. In the evening Dietrichson, Ellsworth, Feucht and Omdal went over to see if it would be possible to bring petrol back with them, but the ice was moving and they had to make a long détour to get back again. They tried to bring one petrol can with them, but were forced to leave it on the ice. "As soon as we have got two cans of petrol here," said I in my diary, "we shall start for Spitzbergen. By our bearings we can take it for granted that the territory from here to the Pole is just the same—drift-ice—drift-ice and again drift-ice. And what should we do there? Substantiate the existence of land. But what is in that? Nothing—it is not worth while. But—perhaps it will be possible to find a place to rise from here. The prospects are not too good, but conditions can change quickly."

The next day passed and we succeeded in bringing the petrol in safety to our own floe. Later at eventide

Dietrichson and Omdal crossed to N.24 to bring back most of the provisions and equipment which had been left there. The temperature was rising steadily, and was now about −6° C. By the 1st of June we had let the new frozen ice get an opportunity to set and become strong enough for a track. That day we tested its thickness and found that it was eight inches (solid enough for our purpose). As soon as we discovered this condition we started to level the track; it was not so easy as one might think. Although the new frozen ice was fine and level in long stretches, there were places where the old ice had taken the liberty of mingling with the new and upsetting conditions entirely. Here the floe was on the slant, with ditches and unevennesses, which gave us much hard work, but it was necessary to get the machine down from the height above on to the new ice. For this a slide was necessary. It is difficult to calculate how much we hacked away and how much we filled in before we completed the work, but it was many tons of ice and snow. By twilight we had finished the track and the slide.

Early the next day we prepared to make ready. Everything must be in good order. Everything must have its place and be properly secured. When we rise nothing must be faulty. By 2.15 p.m. the engine was warm and ready to start. Riiser-Larsen was in the pilot's seat, Feucht beside the motor. We four others stood by ready to either push off or haul in the seaplane just as circumstances demanded. Here again a new task—to manœuvre the seaplane amidst deep, loose snow. When I call this work wearisome I think I have used the right term. While at first the work was particularly heavy, later, when we had had more practice, it was easier, but the whole time it was "weary." Our first attempt was unsuccessful, as the thin ice could not

carry us. We broke through almost at once, breaking the ice on the greater part of the area. The track was about 500 yards long, ending in old screw ice. As we had neared the end of this we turned the machine round preparatory to starting in the opposite direction in the pool which we had broken up. But, as it is said, "the traveller meets many obstacles," and I think this applies particularly to anyone who lands with a flying machine amidst the Polar ice. Hardly had we swung the sea-plane round than thick fog like a wall descended. We could scarcely see from fore to aft, far less to think of flying through the fog at a speed of 110 kilometres. Therefore, my friend, cover yourself with patience, the explorer's indispensable salve. We arranged to watch and to sleep—it was ten o'clock.

Feucht was keeping watch; he passed the time in pushing the machine backwards and forwards in the mushy water to prevent it from being frozen in. I got quite used to the crackling noise of the ice breaking against the sides and in the end I slept to this music. I had slept for an hour, I think, when I was suddenly awakened by a terrific shout: "Come out, everyone, the ice is closing in!" I knew that Riiser-Larsen's voice and tone were not to be mistrusted. Here was danger ahead. There were cracklings and smashings all around, and I expected every moment to see the sides stove in like a concertina. In a rush Ellsworth and I dived for our shoes, the only things we took off during our stay amongst the ice. When I say "in a rush" it is only relatively speaking. For a rush was impossible in our circumstances. The pilot's room offered good sleeping accommodation for two people if they went to bed quietly and carefully. There were so many uprights, struts, and pipes, almost giving our bedroom the appearance of a bird-cage. The making of a miscalcu-

lated movement landed one into a pipe or a strut, sometimes into both. In addition to this one could not stand at full height. To speak of a rush under such conditions is therefore stupid. The sight which met us when we put our heads through the trap-door was interesting, but not altogether inviting. It was interesting to note how much four desperate men can straighten out. The pool we had made was now covered with ice in the centre of which N.25 was stuck. The pressure was tremendous and a catastrophe seemed unavoidable. Gathering all his strength, Riiser-Larsen sprang like a tiger. He jumped high in the air in order to land anywhere on the ice which jammed at the seaplane. The result was always the same. The ice broke under him without resistance. Omdal had got hold of a tool (I don't know which one) and helped his comrade splendidly with its aid. Larsen pushed for all he was worth against the seaplane's nose and tried to free it from the ice pressure. By this united work they managed to loose the machine about 45° and thereby lighten the pressure against the sides. In the meantime Ellsworth and I were occupied in putting the provisions and equipment on the old ice. We were masters of the situation at last, but it was a near thing that time.

To return to our old quarters was unthinkable, so we looked round for a safe place somewhere else. We lay in a favourable position for crossing to N.24, and decided it might be beneficial to pursue that course. There was a possibility that we might reach it by way of the new ice, but this seemed unlikely after our last experience. However, we would try our best to get over, because it would be an advantage to be able to use N.24's petrol without transporting it. Moreover, it appeared that conditions across there were calmer

and offered a safer resting-place. That this was not the case we shall see later.

Thus we began again to hack and to level, and by breakfast time the track was finished. Exactly as though we ourselves had dispersed it, the fog lifted, and we could make a start. This reminds me of an amusing occurrence—amusing for others but not exactly for me. On account of the small accommodation in the machines it was necessary for us always to move about in tabloid form, bent, drawn together and compact. The result of this was cramp, sometimes in the legs, in the thighs, in the stomach, in the back. These attacks came on at the most inopportune moments, and the martyr was a never failing object of general amusement. Everything was ready that morning for departure and I suddenly remembered my glasses, which I had forgotten in the mess, and which I should now rush to fetch. But it was a mistaken move on my part. My first hasty jerk gave me cramp in both thighs, with the result that I could not move from the spot. I heard titters and giggles, and notwithstanding the infernal pain I could not do otherwise than join in the general amusement.

The second start was not more fortunate than the first. The ice broke all the way and N.25 became famous as an icebreaker. One good result came from it, however, namely, that we got near to the other machine, that presented a sad appearance as it lay there lonely and forlorn, with one wing high in the air and the other down on the ice. They had been lucky enough to get its nose up on to a grade of the old ice-floe, but the tail lay right out in the ice.

The conditions here seemed quite promising. We had an open waterway about 400 metres long, with fine new ice quite near. The third attempt to start was undertaken the same afternoon, but without result.

We decided to join up the waterway and the new ice. It was possible that the great speed one could attain on the waterway would carry one up on to the ice, and if that happened there was a big chance of rising in the air, as the track would then have become about 700 metres long. At 2 a.m. on the 4th June we started the work, continuing all day. As we by eventide had got the track finished, down came the fog and prevented us from starting. A little later the ice got rather lively, beginning to screw during the night. Fortunately it was only the new-frozen ice, but even it was eight inches thick. There were pipings and singings all round us as the ice jammed against the machine. The methods and tools we now used were most original. Dietrichson armed himself with a four yard long aluminium pole, with which he did wonderful work. Omdal used the film camera tripod, which was very heavy, ending in three ironbound points. Every blow therefore was trebled and was most effective. Riiser-Larsen was the only one who had brought rubber boots with him; these reached to his waist. As the ice encroached it was met by ringing blows. The battle against it continued the whole night, and by morning we could once again look back upon a conquest. Meantime the old ice had crept up nearer to us. It now appeared as though the "Sphinx" was taking aim at us; this was an ugly, forbidding iceberg formed in the shape of the Sphinx. The movements of the ice had caused the sides of the waterway to set together and our starting-place was ruined again. The fog lay thick on the 5th of June, while fine rain was falling. The ice cracked and piped as though it would draw our attention to the fact that it still existed. *Now* what should one do?

With his usual energy Riiser-Larsen had gone for a walk that afternoon amongst the icebergs, accompanied

by Omdal ; they wished to see if they could find another place which could be converted into a starting-place. They had already turned round to return home as the fog was preventing them from seeing anything, when suddenly it lifted, and there they stood in the centre of the only plain which could be used. This was 500 metres square and not too uneven to be made level by a little work and patience. They came back happy and full of hope and shouted to the " Sphinx " : " You may be amused and smile even when others despair, but even when the position seems hopeless we can still sing with pleasure, aha, aha, aha, a. Things are improving day by day."

The " Sphinx " frowned ! It did not like this !

The way to the plain which the two men had found was both long and difficult, but we lived under conditions where difficulties frightened us no more. First of all the machine must be driven there—about 300 metres through new ice to a high old plain. Here we would have to hack out a slide to drive the machine up. From here the road crossed over to the Thermopylæ Pass, which was formed by two moderately sized icebergs, and ended in a three yards wide ditch over which the machine must be negotiated on to the next plain. On the other side one could see the last obstacle which must be overcome in the form of an old crack about five yards wide, with sides formed of high icebergs and loose snow—rotten conditions to work in. Early on the morning of the 6th the work was started. After breakfast we took all our tools and attacked the old ice where the grade should be built. In order to get to this spot we had to pass round a corner which took us out of sight of N.25. Under general circumstances one would not have left the machine unattended, but conditions were otherwise than general and we had no man we could spare. Singing

"In Swinemünde traumt man im Sand," the popular melody associated with our comfortable days in Spitzbergen, we used our knives, axes and ice-anchor to the best advantage, and fragments of ice flew in all directions. It is with pride and joy that I look back on these days, joy because I worked in company with such men, proud because our task was accomplished. Let me say quite frankly and honestly that I often regarded the situation as hopeless and impossible. Ice-wall upon ice-wall raised themselves up and had to be removed from our course; an unfathomable gulf seemed to yawn before us, threatening to stop our progress. It had to be bridged. Cheeky heroes who, never grumbling, tackled the most hopeless tasks with laughter and with song.

At 1 p.m. we went on board for soup. The ice was then calm. The "Sphinx" lay in the same position. Oh! how good the thick pemmican soup tasted! Five hours' hard work on a cup of chocolate and three small oatcakes gives one a good appetite. At 4 p.m. Dietrichson went on board to fetch something and on his return remarked that it seemed to him that the old ice was approaching the seaplane. Now he, during the last days, had suffered a little from snow-blindness, and we thought accordingly he had made a mistake. It was indeed a mistake. We should have gone at once and looked into the matter. One must, however, remember that every second is precious and that we grudged stopping work. At 7 p.m. we went on board to eat our three biscuits. The sight which then met us could have filled the bravest heart with despair. The great pack had approached the seaplane to within some meters. The "Sphinx" seemed to bow and chuckle with amusement. Now it would have us! But it had laughed too soon. The six men that it now looked upon were not the same six who some days ago had arrived

through the air from a place full of life's comforts ; the six now were hardened by obstacles, weariness and hunger, and they feared nothing on earth, not even the "Sphinx." "Hurrah! heroes. Hurrah for home and all we hold dear. The devil take the 'Sphinx.'" And so the work began and in its performance we got more self-confident than ever before as we managed to turn the heavy machine round in the course of a few minutes. What task each person specially performed it is difficult to say, but it was an herculean task. We lay down, we pulled, we toiled, we scratched. "You shall go round!" Before we realized it there it was turned 180°, and the course set for the new slide. The "Sphinx" hung its head and looked sad, but the next day it lay exactly on the spot where N.25 had lain. During this performance N.24 was pushed on to the plain which it had lain beside. Still a little more levelling and the slide was ready. To shouts of joy the machine, in the evening at eleven o'clock, was driven over the track and stopped exactly beside the Thermopylæ Pass. To-morrow there would not be much to be done.

The 7th of June. Norway's Day! At home they would be wearing light summer clothes and enjoying life, while flags flew over the whole land from the North Cape to Neset. But don't think that we forgot this day. No! From the N.25's highest point our silk flag flew, and our thoughts—oh! don't let us think at all of them!

The side of the pass was formed by two gigantic icebergs which will have to be more than half cut down before the wings can pass over and the great ditch must be filled up with ton after ton of snow. But the 7th of June is a good day to work on for homesick folk. The knives are driven with greater certainty, the axes swung with greater power, and in a remarkably short

time the ice giants dwindled to dwarfs. We experienced a very exciting episode on this occasion. While Riiser-Larsen drove the machine over the snow glacier, Dietrichson went past and did not get out of the way. At the last moment he threw himself down flat on the ground and the tail-skid passed so near to him that I could not see daylight between. It was in the words' fullest meaning a narrow escape. "I saw you all right," remarked the pilot later. "But I could not stop in the middle of the track's bridge." That his words were true was proved by looking back and noting that the bridge was no longer there. It was a delightful feeling to sit on a "flynder" and rush across the snow plains. It was not often we got the satisfaction, as we usually had to stand by ready to push or haul the machine over the snow. But this intermediate plain was hard and the pilot could manage to steer with the wheel. And thus we stood before the last ditch which had to be filled and levelled. It took us six hours before it was finished and the machine landed in safety on the big plain. It had been thawing the whole day and was uncomfortably warm for working, but one could always throw some clothes off. We were not so particular about our appearance.

The 8th June brought us fog and half a degree of heat. It drizzled the whole time. Exceptionally uncomfortable. We were now faced by another hard task, namely, turning the machine round in the deep wet snow. We were unused to this work, and consequently were fairly clumsy. In addition to this we had to decrease our daily rations from 300 to 250 grammes, insufficient to keep up our strength. Our work in the deep wet snow of this plain was wearying. More wearying than ever before. Do you remember, comrades, how we made the turning platform? You will scarcely

have forgotten that? The machine was driven up to the starting-place and must be swung round 180° to face the right direction. The snow, as already said, was deep and wet, and any turning of the machine under these conditions was hardly possible. What should we do now? There was only one thing to be done, namely, to dig down to the ice and turn the machine on that. The snow here was from two to three feet deep, and every spadeful was a heavy weight to lift, particularly as we used the big shovels. We cleared a circular place with a diameter of 15 metres. That got the name "Turning-table!" Had we solved our problem by this you might have forgotten the turning-table by now, but, when we tried to turn the machine, we found that the skids caught in the ice and stopped the whole progress. Again we were faced with the question: "What shall we do?" And someone was struck by a bright idea—to lay a snow-skate underneath. We all agreed the idea was good, but to accomplish it was not easy. We must lift the machine, and it weighed 4½ tons. But even that did not frighten us. It was not to a great height that we had to lift it—just about two centimetres, but we were only five men in so far that the sixth must place the snow-skate underneath. Never mind, come on, my heroes. Lay your shoulders to the wheel and lift. And then five backs are bent in unison, and one! two! three!—we had got it up on the snow-skate at last. We continued working steadily, regardless of time's flight. From 4 a.m. on the 8th of June to 4 a.m. the next day. During that time starting-place No. 5 was worked on, tried, and approved. The fog lay thick and heavy, while the drizzle continued all day on the 9th, but Riiser-Larsen insisted that the track should be completed. Think now what a problem we had before us when we started to work that morning. A track—500 metres long—12 metres

broad—should be made in wet snow three feet in depth. The snow which should be cleared away from the track must be thrown at least six yards away from each side so that it should not get in the way of the machine. We had lived on 250 grammes daily for several days, so you will not be astonished when I say that by evening we were absolutely worn out. I watched with wonder the two giants who wielded the shovels all the day. We others did what we could, but our work was trifling compared to theirs. On the 11th we set to again after breakfast, but we could not keep up this strenuous work ; an observer would have noticed at once that he had a number of worn-out people before him. The clang of the spades got slower, the rest-intervals longer and longer, till in the end we stood quite still and stared at each other. It seemed an impossibility to get the snow shovelled aside in a reasonable time. Whilst we stood discussing it, Omdal walked up and down in the snow. It was only a chance that he did so, but a chance which brought about important results. " See," he shouted suddenly, " this is what we can do instead of shovelling." The place where he had trekked was quite hard, and with a little frost would give a splendid surface. In the afternoon we started our great trek. Foot by foot of the track of soft wet snow was trodden into a solid road. It was still thawing, but we knew that if it turned frosty it would become a perfect track—and it was only natural to expect that frost would come. To get the surface even we had to remove long and high stretches of ice-formation containing tons upon tons of ice. On the 14th of June, as we laid down our tools, I don't think I exaggerate when I say that all in all we had removed 500 tons of ice and snow. That day we made two starts, the sixth and seventh, but the foundation was still too soft as we had had no constant frost. Certainly the

temperature that day had been as low as −12° C., but then it rose immediately after to 0° again. It was impossible to get up sufficient speed to rise; the machine sank down into the snow, and in a number of places dragged the whole of the underlying snow with it. (Now will it freeze or not ?)

The 15th of June was fixed as the latest day for our next attempt to start. If that was not successful we must collaborate and decide what could be done. There were not many ways to choose from. Either we must desert the machine and attempt to reach the nearest land, or we must stay where we were and hope for an opportunity to rise in the air. We had performed the miracle of leaving Spitzbergen with one month's provisions, and yet after four weeks had passed we found we had provisions for six weeks. We could thus hold out until the 1st of August. In my lifetime I have often been faced by situations where I found it difficult to decide on the right course of action, but to choose in this case with any degree of certainty would be more difficult than the making of any previous decision. The first alternative—to set off in search of land—appeared to me to be the most sensible, as, should our provisions run out, it was possible further south that we might find edible animal life. In addition this plan had the great advantage that it would occupy our thoughts with the work we had ahead. Against this plan the fact of our modest equipment and our probably weakened condition must be weighed. When I privately considered these two alternatives I always came to the conclusion that to look for land was the most sensible, but as soon as I decided on this course a voice whispered in my ear : " Are you mad, Boy ? Will you leave a complete and good machine, filled with petrol, and go down into the high broken ice where you know you may

perish miserably ? A waterway may open up before you to-morrow, and then you will be home in eight hours' time." Will anyone blame me for my indecision when I found it so difficult to choose.

On the evening of the 14th we cast aside everything on to the ice except the most necessary, and that we placed in a canvas boat. We kept sufficient petrol and oil for eight hours, one canvas boat, two shot-guns, six sleeping-bags, one tent, cooking utensils and provisions for a few weeks. Even our splendid ski-shoes had to be set aside as they were too heavy. Of our clothes we only kept what we could not do without. All told it amounted to about 300 kg.

On the 15th of June we had a temperature of $-3°$ C. with a little breeze from the south-east, just the very wind we required. The track was frozen fine and hard during the night, but the sky was not too promising —low-lying clouds—but what in all the world did we care about the sky ! The thickest fog would not have kept us back. In this light the track was very difficult to see ; small black objects were, therefore, placed at each side so that the pilot would be certain to make no mistake. A little too much to one side or the other could be fatal. At 9.30 p.m. everything was clear and ready for a start. The solar compasses and the engines started. They were three-quarters warmed up. I cast a last glance over the track and walked along it to pass the time. It ran from north-east towards south-east. A few yards in front of the machine there was a small crack across the ice. It was only a few inches wide, but there it was, and at any moment it might open and separate the little corner we stood upon from all the rest. For the distance of 100 metres the track rose quite gradually in order to become level. Two hundred metres away, on the floe's south-east end, there also lay a crack

right across, but this was of a much more serious nature, and had caused us many uneasy moments. It was about two feet wide, and filled with water and mush. This seemed to show that it was connected with the sea and could give us a few unpleasant surprises sooner or later. Should this crack widen and tear away 200 metres of our track, the latter would be entirely ruined. The floe ended in a three-foot broad water-lane ; on the other side of it, direct in the line of the track, lay a flat 40 metre long plain, which one will understand was far from ideal, but absolutely the best which the place could offer us. At 10.30 everything was in order. In the pilot's seat sat Riiser-Larsen, behind him Dietrichson and I, in the petrol tank Omdal and Feucht, and Ellsworth in the mess. Dietrichson was to navigate us homewards and should really have taken his place in the observer's seat in front of the pilot. But as that was too exposed in view of the nature of the task we were undertaking, his place was allotted further back at the start. This was undeniably a most anxious moment. As soon as the machine began to glide one could notice a great difference from the day before. The hasty forward glide was not to be mistaken. One hundred metres off, we started at top-speed, 2,000 revolutions a minute. It trembled and shook, shivered and piped. It was as though N.25 understood the situation. It was as though the whole of its energy had been gathered for one last and decisive spring from the floe's southern edge. Now—or never.

We rushed over the three-metre wide crack, dashed down from the 40 metre broad floe, and then ? Was it possible ? Yes, indeed ! The scraping noise stopped, only the humming of the motor could be heard. At last we were in flight. A smile and a nod and Dietrichson disappeared into the observation compartment.

And now started the flight which will take its place amongst the most supreme in flying's history. An 850 kilometre flight with death as the nearest neighbour. One must remember that we had thrown practically everything away from us. Even though we had managed by a miracle to get away with our lives, after a forced landing, still our days would be numbered.

The sky was low and for two hours we were compelled to fly at a height of 50 metres. It was interesting to observe the ice conditions, so we eased down. We believed that in different places we observed from the sky that we could distinguish open water all around us. But it was not the case. Not a drop was to be seen anywhere. Ice in a chaotic jumble all around. It was interesting also to see that the floe, which from first to last had given us freedom, was the only floe within a radius of many miles which could have been of any use to us. N.24 got a farewell wave and was thus lost to sight for ever. Everything worked excellently, the engines went like sewing-machines and gave us unqualified confidence. Both solar-compasses ticked and worked, and we knew that if only the sun would appear, they would be of invaluable assistance to us. The speed-ometers were placed. By the wheel sat the pilot, cool and confident as always. In the navigating compart-ment was a man I trusted absolutely, and by the engines two men who knew their work perfectly. Ellsworth spent his time making geographical observations and photographs. I myself managed to get what was impossible on the journey north, a splendid oppor-tunity to study the whole flight. The course was set towards Spitzbergen's north coast land, around Nord Kap. In the two first hours we steered by the magnetic compass. This had been considered an impossibility, hitherto, so far north, but the result was excellent.

When the sun broke through after two hours and shone direct on the solar compass, it showed us how exactly we had steered. For three hours the atmosphere had been clear, but now it turned to thick fog. We rose to a height of 200 metres, flying over it in brilliant sunshine. Here we derived much benefit from the solar-compasses and were able to compare their readings with the magnetic compass. We had fog for an hour and then it cleared again. The condition of the ice was as on the northern trip, small floes, with icebergs on all sides. There was apparently no system in its formation ; everything was a jumble. There was more open water than on the northern tour, but no waterways, only basins.

In 82° N. Lat. the fog descended again. The pilot tried for some time to fly under it, and this was a flight which would have delighted people who seek for nerve-splitting thrills. The fog got lower and lower, till at last it stretched right over the icebergs. With a speed of about 120 miles, one gets a different impression of flying. With a rush we passed over the top of the icebergs, one after the other. At a great height one does not notice the terrific speed. One is, on the contrary, astonished how slowly one appears to be travelling. Several times icebergs peeped up directly under us, so close, in fact, that I thought " We shall never clear that one ! " But the next moment we were across it. There could not have been more than a hair's breadth to spare. At last the conditions became impossible ; fog and ice blended into one. It was impossible to see. There was another point as well which was of special weight, namely, the nearness of Spitzbergen. Should we fly into the high cliff walls with a speed of 120 kilometres there would not be much left of us. There was only one thing to do —to fly over the fog, and that was exactly what the pilot decided to do.

Up 100 metres high,—and we were above the fog in brilliant sunshine. It was observable soon that the fog was thinning, began to lift more and more in big masses, and soon we could see territory under it. It was not inviting; nothing but small ice with a little water amongst it. When I speak of the impossible landing conditions it is only to show that to land here would have meant certain death. Such a landing would have crushed the machine and sent it to the bottom. The fog lifted steadily and soon disappeared entirely. It was a fresh southerly breeze which brought about this welcome change. The fog had lain thickest in the south, but now that began to move away as well. Large sections of it tore themselves away from the great mass and disappeared in small driving clouds. Where was Spitzbergen? Had we steered so mistakenly that we had flown to the side of it? It was quite possible. One had no experience in the navigation of the air in these regions. Over and over again the general opinion of the magnetic compass's uselessness in this district came back to my mind as I sat there. The solar compass had—as soon as we got the sun—shown a reading in agreement with the magnetic compass, but it was set at——? At what? If only I knew! There was probably no ground for anxiety, yet I felt dubious. We ought to see land by now. We had not enough petrol to last long—and still no land. Then suddenly a big heavy fog-cloud tore itself away and rose slowly, disclosing a high glittering hill-top. There was scarcely any doubt—It must be Spitzbergen. To the north lay some islands. They coincided with Syv Öene and the land stretched out in a westerly direction. But even if it were not Spitzbergen, it was still land—good, solid land. From the islands there stretched a dark strip northwards. It was water—the great open sea. Oh!

what a delightful feeling,—sea and land and no more ice. Our course lay southwards, but to get more quickly away from the ugly conditions beneath us, the course was set westwards and downwards to the open sea. It was more than a clever move on the part of the pilot,—it was refreshing to see how instinct came to his aid—because the controls were showing signs of wear. It is enough to say before we had got right across the sea the controls jammed and an immediate landing was necessary. It blew with a cold blast from what we later learned was Hinlopen Strait and the sea was high and rough. The forced landing was accomplished with all the assurance and experience which always distinguished our pilot. We left our places and all went aft in order to allow the nose to lift as high as possible. The pilot was the only one left fore. He flew most carefully, guiding the boat and manœuvring it against the highest waves, which were of tremendous dimensions. We who were aft kept warm and dry, but it was a different matter for the man at the wheel. Time after time the waves lashed over him, wetting him to the skin in a few minutes. It was not "*spray*" which we shipped when the waves broke over us. Unused as I was to manœuvres of this kind, I expected every moment to see the bottom stove in. It was seven in the evening when the forced landing was accomplished, and it was not until eight that we reached land. It was a fairly shoaly bay we entered into, and the landing-places it offered us were not of the best. We found a sloping side of the coast ice where we could climb ashore. The wind now laid and the sun shone against the heavy stones which lay on the beach. Here and there a little fresh rill ran between them, singing as it descended from the hillsides. The sweet voices of birds fitted in with our gentle mood of eventide, and inspired in us a feeling of solemnity. There was no need to look for a church

wherein to praise God the Almighty and offer up to Him our burning thanks. Here was a spot amidst His own wonderful Nature. The sea lay smooth and calm, with here and there tremendous pieces of ice protruding from the water. The whole scene made an ineradicable impression on us, which can never grow dimmer. The plane was moored to a large piece of ice so that it swung free, and all of us went ashore. There were two things which it was necessary for us to do in our own interests. First to discover our whereabouts and then to have a little food. The chocolate and the three biscuits we had taken at 8 a.m. no longer satisfied us. Whilst Dietrichson "took the sun" the rest of us got the meal ready—a repetition of breakfast. How good it tasted! How fine it was to jump about amongst the big rocks! We became children again. All around lay drift wood which we could use for firing if we remained here any time. The 90 litres of petrol which we had must be used sparingly.

Omdal, who had been our cook during the whole trip, still wished to set the Primus going, as there was still a little drop of petrol left in it, and he was busy with it when suddenly Riiser-Larsen shouted: "There is a ship." And truly, there in the east, round the nearest point, came a little cutter, gliding along. Had misfortune earlier been our lot, luck seemed now to overwhelm us.

It was now 9 p.m. and Dietrichson had just completed his observations. We found that we were exactly at Nord Kap on Nordostland, the very spot we had steered for in the morning. Thus the flight was a master-stroke on the part of the man who directed the machine, while the navigator shares the distinction with him. It was a splendid deed! But—the little cutter had changed her course and apparently had not noticed us. She

moved extremely quickly and must therefore be fitted with a motor engine. What should we do? What should we do to communicate with it? "Nothing easier," said the flying-men. "Just sit tight and you shall see." In a second everything was brought on board the plane, the motor started and we rushed over the sea, stopping exactly beside the cutter. It was the cutter *Sjöliv* of Balsfjord—Captain Nils Wollan. A jolly-boat was lowered and with two men rowed across to us. They seemed in doubt as to who we could be, dirty and bearded as we were. But when I turned slightly round I exposed my profile—and they knew us at once. Would they tow us down to King's Bay as our petrol was almost done? They would be delighted to do this, in fact Wollan would have certainly towed us to China if we had asked him, so glad was he to see us, so beaming with kindness and goodwill. We had a rope attached to N.25 and we all went on board the *Sjöliv*. There for the first time we felt the expedition was finished. Quietly and calmly we shook hands with each other—it was a handshake that said much. We were received by all the crew with hearty welcome and shown down to the cabins. This part of the ship was not exactly a ballroom; the cabins on the *Sjöliv*—2 × 2 metres—compared with what we had had in the last four weeks, were roomy and comfortable. These good people cleared out of them absolutely and handed over the whole place to us. In the two broad bunks which were there four of us were able to sleep, while two got bunks in the men's quarters.

"Will you have coffee?" was the first question. Would we! Yes, certainly, and as quickly as possible, with a smoke thrown in. We had been tobaccoless for the last days, and now were longing for a smoke. The first coffee was not an unqualified success; the coffee-

THE CREW OF THE "SJØLIV."

THE MEMBERS OF THE EXPEDITION AFTER THEIR FIRST LUNCH.

pot was set on the fire to warm and, in a mighty roll the cutter gave, it flew straight into Riiser-Larsen's back. He was thus the first to get coffee, but if he appreciated the honour, his language expressed a totally different opinion. They apologized to us for the egg pancake and the seal flesh which comprised the next course, but apologies were unnecessary. All the food disappeared as though a whirlwind had passed over the table—and this, despite the fact that we had decided to eat sparingly after our long restriction.

The towing of N.25 proceeded all right in the beginning, but during the night a southerly breeze came up, blowing direct down from the hills. The waves increased steadily, and as we steered westwards towards Hinlopen Strait, we decided that we must turn landwards and anchor. We only got to bed at 5.30 a.m., after traversing an endless number of roods.

At eleven o'clock the next morning we were up again. It was blowing a gale and we lay badly. We decided, therefore, that we should go into the nearest bay to find a calm and safe harbourage for N.25, let it remain there while we went on to King's Bay for assistance, return for the seaplane and fly it down. The nearest harbour was Brandy Bay. We looked at each other as much as to say, "Can we really permit ourselves to enter a place with such a name?" The ice here lay at the bottom of the bay, and we got the machine safely towed through it. At 8 p.m. we steered for King's Bay. It was a windy passage through Hinlopen Strait. The sea was high and rough and the *Sjöliv* enjoyed herself royally. If our feelings agreed with hers, I should not like to say. On the 17th we sailed along Spitzbergen's north coast in summer sunshine and warmth. We passed a few vessels and asked if they had seen the *Hobby*; but, "No, they had not."

As we passed Virgohavn we hoisted all our flags, and the little *Sjöliv* was in gala attire. We wanted to honour the memory of the man who, for the first time, sought to reach the Pole through the air—Salomon August Andrëe. Was there anyone in the world who had more right to honour the memory of this man than we six who stood here looking over the place from where he set out on his sad expedition. I scarcely think so. We lowered our flag and continued.

At 11 p.m. we rounded Cape Mitra and there lay King's Bay before us. It was a wonderful sensation to sail back through the bay and see all the old, well-known places again. The ice had vanished, melted by the sunshine as loon and auk gambolled in its rays. Anxiety was rife amongst us as we sailed in. Was the *Hobby* here or not ? The skipper looked out, came back and announced that the *Hobby* was not here ; only a coal-boat lay by the quay. As we approached, one or other of us went continually to look out ; suddenly someone cried : " Yes, there is the *Hobby*. And another boat lies there also, but I can't distinguish which it is." Our relief was great. There lay the *Hobby* and many of our dear friends were near. " Hullo," someone cried from above, " the other boat is the *Heimdal*." " No, you must be mad. What would the *Heimdal* be doing here ? " answered another. We had not the slightest idea what awaited us. Nearer and nearer we approached. " Shall we raise the flag ? " said the skipper. " No," I answered, " there is no reason to do so." But a little later someone said : " Surely we must greet the naval flag." " Yes, naturally. I have forgotten my good manners on the trip," I had to admit. So up went the flag, and the *Sjöliv* approached the quay. We continually had our glasses directed on the ships ahead ; suddenly someone exclaimed : " Good gracious, two flying machines are lying there." And

true enough, there lay two Hansa-Brandenburgers ready for flight. Surely they were destined for a North Coast charting survey, as that had been discussed last year. Yes, that seemed quite possible. That we were the reason for all this excitement never entered our minds. We came on nearer and nearer. We could now see that they were beginning to direct glasses on us from the coast, showing interest in the little cutter. As we sailed in one of our people who saw a comrade on board the *Hobby* shouted: "Hullo, Finn, how is everything at home?" That was the signal for great excitement. We saw them run round each other in jubilation, shouting and gesticulating. What in the world was the reason for all this? Soon we were to know. The motor stopped and the *Sjöliv* sailed up alongside the *Hobby*.

The reception we got will never be forgotten, not even when other things fill our thoughts. They wept, they took hold of us, they looked at us with unbelieving glance. "But, Great God, is it you?" They simply did not realize that it was us. But now they explained how they had waited and waited, insisting that they had never given us up, while in their hearts they knew they had. And suddenly there we stood amongst them —the dead returned to life. No wonder that the reaction was great. Not one sensible word was said during the first half hour. There stood all our dear old friends: Captain Hagerup, Lieutenant Horgen, Zapffe, Ramm, Berge, etc. They looked so happy. And there were the dear fellows who had been sent to our relief, Captain Blom of the *Heimdal* and First Lieutenant F. Lutzow-Holm with the air fleet.

The last to come down, not because he wished to be late, but because it took him a long time to traverse the road from the Director's house, was our dear host, Stakkars Knutsen. He had run so fast that he had to

stand for a time to regain his breath. It was a warm reunion. Amongst all who had missed us in that time there was scarcely anybody whom our absence had made more uneasy. Late and early, we were told, he had scanned the horizon looking for us. Never had we been out of his thoughts. Big, strong man as he was, he had the warmest and softest of hearts. No wonder then that the meeting with Knutsen was regarded as an outstandingly important incident.

We had to be photographed from all sides, although a record would appear on the plate of a month's whiskers and dirt. In an hour both would have vanished. And so we set off to our old King's Bay quarters, where we had passed unforgettable days before our departure. It was like a delightful dream to see it again. Every day as we had sat in our little mess of N.25 taking our humble meal it was remarked on every side: "Oh! if only we were back at Knutsen's." And now we were there. We felt we wanted to pinch ourselves and ask: "Is this really possible? Can you really eat as many biscuits as you wish?" There was no time to shave and wash first. No! Berta had now taken command, and we should first and foremost have food. As we stepped into the room cheering broke out. The Station welcomed us back, and never has our National Anthem sounded finer than it did as we stood in the little square room listening to the tones of what is our dearest hymn. I believe there was not one dry eye in the company. "Gud sygne dig landet vaart. Vi gir dig med glede alt."

On the next day, about three or four o'clock, the steam bath was ready and a change was effected; hair and whiskers disappeared. We were all very thin, but we noticed it now more distinctly. It looked as though Riiser-Larsen could have put his collar twice round his

neck—the same size of collar which had even been tight for him when he set out for the north.

What time we went to bed that night I really cannot say, but I do know that when I came out next morning and looked around one of the finest sights met me, making an ineradicable impression. On the flagstaff right before the house, waved our big, beautiful National flag in a light summer breeze. The sun was blazing down and the glaciers around shone like silver in its rays. All seemed to be in festal dress. The hills blushed with the finest little flowers, and the birds twittered and sang. In the harbour lay the boats fully beflagged. Yes! it was almost necessary to pinch myself to see if I was really awake. It seemed more like a fable.

On June 20th at 2 a.m. the *Heimdal* left the Bay with flying men, mechanics, and photographer on board. They were off to Brandy Bay to fetch the machine. At eight next evening they were back with the apparatus in good order. We were dining when they arrived, but the hum of the motor brought us all to our feet. There she came gliding elegantly along and landed immediately afterwards. Now we got a holiday which we all keenly appreciated. It reminded me of my happy days when I could lie in idleness in the country and get fat! Hundreds of telegrams streamed in daily from all corners of the world. The King and Queen were first to send a greeting. "The Queen and I wish you and your companions welcome back. I thank you for your enterprise and that you have again brought honour to Norway. Haakon R." The Crown Prince's followed immediately after. Then came the Storthing, the Government, the Universities, all the towns, a number of districts and clubs, and all the foreign Legations. Telegrams from abroad also poured in with congratulations. One from the English King, the German President, the Geographic

and Scientific Associations being amongst them. It was hard days for the telegraphists here in the north, but they were specially smart. The telegraph service on board the *Farm* and the *Heimdal* gave us invaluable assistance. In addition to this the King's Bay Coal Company's telegraphist, Herr Hagenis, worked at high pressure all the time.

On June 23rd the *Hobby* left us to return to her home —Tromsö. It was like losing an old friend, for we had been so glad to have with us all these clever, splendid people who went with her—Ramm and Berge accompanied them.

St. Hans' Eve was celebrated with due ceremony—bonfire, song and dance. The Coal Company's chartered boat *Albr. W. Selmer*, which came into the station on the 21st of June, was ready by the 25th with loading coal and took on board (the same afternoon) N.25 and the Navy's two Hansa-Brandenburgers. They were shipped as they lay on the water, N.25 forward and the two others aft. The *Albr. W. Selmer* was suddenly turned into something which looked like a cross between fish and fowl. The planes were stretched out at both sides, and must have looked a most unusual sight to any ship meeting her. The *Selmer* was an old boat, but quite suitable to take the whole expedition south. Furthermore, she had sufficient room to carry the machines quite easily and could house all the members. Captain Aasgard, her captain, and his officers, made room for us with customary Norwegian hospitality and kindness, and we of the expedition had the whole of the ship's after-part given over to us. Thus we had the officers' quarters and saloon. It was hard to say good-bye to Knutsen and King's Bay. We shall always hold as one of our dearest memories the wonderful hospitality and kindly care which was shown to us there on our return.

At eleven o'clock the *Selmer* left King's Bay in glorious weather. The midnight sun stood high in the heavens and the hills around were brightly illumined. From the *Heimdal* we heard the sounds of them playing "Ja vi elker," and from the station's height cheers broke out. The flags were dipped—one last farewell and the station disappears—our dear home—behind us. We were ten passengers, Captain Hagerup, Lieuts. Riiser-Larsen, Dietrichson, Horgen, Lutzow-Holm, Omdal, Zapffe, Feucht, Ellsworth and myself. It was an unforgettable holiday—and festal journey. The intention was that we should sail down outside the Islands all the way, anchoring at Lang-Grunnen, from whence we should enter Horten. This, however, was altered as time passed. We met a heavy swell coming from the east, making it dangerous for our machines. We must therefore hug the coast as quickly as possible and at 11 a.m. June 29th we passed Fugleö. Telegrams continued to come in such numbers that the ship's second mate, who was also radio-telegraphist, was overworked. Near Tromsö we were overhauled by the S.S. *Richard With*, belonging to the Vesteraalske Steamship Company. As it passed it hoisted its flags, and broke out into loud cheers as all on board waved and shouted. This was the first greeting we had had of this kind. Unexpectedly as it came it absolutely overwhelmed us. It was a delightful greeting and will never be forgotten. Now we had an idea what awaited us elsewhere, and as we saw the tremendous preparations in Tromsö Sound we were prepared. Out shot two large flag-bedecked ships full of festal-clad jubilant people. A little further forward we saw our old friend the *Hobby* so gaily decorated and so laden with people that she took our breath away. Speeches were made, songs were sung and people cheered. The passage through Tromsö Sound was triumphant. A proof of the

warm-hearted hospitality characteristic of the people. The wonderful summer weather continued all the time and our journey along the coast was like a trip through Dreamland. Our beautiful flag was to be seen everywhere and greeted us with the same glowing warmth. Fir trees and birches were dressed in their most lovely green, reminding us of Fairyland as we glided past. Here and there lay a solitary little fishing-boat, and I felt many times a lump in my throat when their sunburnt men stood up, raised their hats and sent us their "Welcome Home." It was a calm but deep welcome which, in contrast to other more demonstrative greetings, filled us with calm emotion.

Outside Kristiansand we received our first visible welcome through the air. It was the Fleet and Army greeting us. Four Hans-Brandenburgers circled round us once and then disappeared again. A delightful welcome. On the afternoon of July 4th we passed Færder and entered Oslo-Fjord, and were met with jubilant crowds by air and by sea. At Fuglehuk we encountered one of the most affecting scenes which we had lived through all the time—the meeting between the flying-men and their wives. The companion-ladder was lowered, all heads were bared, and the two women, who had borne the hardest part of the expedition, climbed on board. If I only had command of all the world's flags I would dip them in honour, if I only had all the world's guns I would fire them all, to give these brave women a reception worthy of an empress, for as such I regarded them.

At eleven o'clock at night we sailed in to Horten's Quay. Every attempt to describe this would be in vain. It was like the Arabian Nights. I was happy to go ashore at Horten, for in the past I had harvested so much good there that I stood in deep gratitude towards

The Reception.

Driving through the Streets

this place. Not one of my expeditions had ever set out without the Norwegian Navy playing a great part in them, this last one being indebted in an overwhelming degree. It was through the Norwegian Navy's Air Service that the last trip was really made possible. Thanks to their liberal granting of necessary permission ; thanks to their giving us clever men ; thanks to them again it was possible to set off on our enterprise.

Thus came the day—the great, the unforgettable day —the 5th of July, 1925. Summer favoured us in its fullest glory. Who can describe the feelings which rose within us as we of the N.25 flew in over the flag-bedecked capital where thousands upon thousands of people stood rejoicing ? Who can describe the sights that met us as we descended on to the water surrounded by thousands of boats ? The reception on the quay ? The triumphant procession through the streets ? The reception at the Castle ? And then, like a shining crown set upon the whole—their Majesties' dinner at the Castle. All belongs to remembrance—the finest and the most unforgettable.

PART II

THE SECOND IN COMMAND'S TASK

PART II

THE TASK OF RIISER-LARSEN, THE SECOND IN COMMAND

"THE Air Club has fixed up contracts with the publishers of several countries for a book of at least seventy thousand words. Therefore you must write several thousand. Come and stay with me so that you can work in peace." Such were Amundsen's orders immediately we stepped ashore in Oslo.

The manuscript of the entire 70,000 words should be delivered by the 10th of August. In view of the big task of arranging charts and pictorial matter, there would not be much time to spare, so we had to get down to it as quickly as possible.

There were also many other things to be done in the meantime. The expedition's cinema film had to be cut and run off—run off again, and re-cut, as the cinema owners wanted to "fit in" three shows daily at 5 p.m., 7 p.m. and 9 p.m. It would take fifteen minutes to clear the theatre, to ventilate it, and let the next audience get seated, therefore the run of the film must not exceed one hour and three-quarters. At first it took two and a half hours even without the caption lines. Berge continued cutting, and the film got shorter daily. The worst task was to arrange the sequence of the scenes. They were far from being in chronological order, but after a time it began to present a better picture of the expedition's course—a picture which gave a calm, straightforward story—a calendar of daily episodes.

The caption lines, too, required writing, as they could not create themselves.

Whilst we were busy with all this work we had also to attend to the returning of the expedition's unused stores to the suppliers. Much of this had been bought conditionally that we could return everything we had not used. The ever-helpful Omdal, who never seemed to have enough to do, took charge of this part of the work. The more I left to him the better pleased he was. I asked him often in those days if he would not like to be released to go home. "So long as I can be of use to the expedition there is no hurry," was his reply. At last on August 1st he set off to his home in Kristiansand which he had been longing for so long. But I am sure he would have been quite happy about it if I, even then, had said to him that he could not get off.

That's the sort of man Omdal was!

In the meantime the post-bag was filled with requests for information regarding the instruments and other equipment we had used on the trip. Lantern slides for lectures had to be got ready and advertising matter sent to our business managers.

Thus the days passed and the dreadful 10th of August got nearer, so threateningly, that at last to-day I had to take the bull by the horns and go to Amundsen for further particulars.

Now I sit here experiencing the same feelings as in my schooldays, when I used to put off writing Norwegian composition so long, that I had to do it during the games interval.

The first thing I shall render an account of is:

Why we chose the Dornier-Wal type.

As the expense of using airships was prohibitive, we could only consider the employment of flying-machines.

The choice of type depended upon the idea we could form of the landing conditions amongst the ice. The highest authority in the "world of polar-exploration," and many others who had hunted and fished Greenland's east coast for many years, all contended that there would be many suitable landing-places on the numerous big flat ice-floes, and also that we should find water-lanes where the sea-planes could land. Some voices were raised against these contentions, but as they were only "voices" we didn't lay much weight on their opinion, though, as was proved later, these latter were right—but that is a different matter. We regarded it at that time as certain that we should find plenty of big enough landing-places. Accordingly we based our plans on making an expedition which could land to carry out observations and which would be of considerably more value than an exploration expedition which would only fly over the ice. An expedition thus equipped would be safer, as a forced landing might have to be made at any time. We decided, therefore, to use two machines, which would allow the expedition to continue with one plane if the other had to make a forced landing on account of irreparable engine-trouble. In a forced landing, too, the machine might be damaged, as there would not be the same opportunity to find a suitable landing-place as in the case of a voluntary landing. It is also certain that it would double the chances of reaching the goal ahead to set off with two machines rather than with only one—always, of course, banking on the probability of good opportunities for landing being found.

On the other hand, if such opportunities for landing did not offer, the use of two machines would halve the chances of success, as the risk of engine trouble where two are concerned is naturally double what it would be if only one machine were employed. The arrangements,

therefore, were, that both seaplanes' crews should keep together.

When we made our forced landing on the ice we were convinced that there were no suitable landing-places to be found up there, and in consequence we decided that we would only use one seaplane for the homeward flight. We spent some days at first getting both machines ready for a start, because starting conditions were *so* difficult, that it was an advantage to hold one machine in reserve in case the other should get damaged in attempting to get away ; but we discovered that it would take the six of us to tackle the work in each case, so we chose the machine which was in the best condition and therefore safest for the homeward flight.

The reason why I have gone into so many details regarding this side of our plans and our conduct of the expedition, is, that we have been publicly criticized " because we flew with *two* machines over a stretch of territory that offered no landing possibilities, and thus we took a *double* risk of engine trouble." This is putting a wrong construction on it. The reason that we continued our northward flight after we had reached 83°, and, being free of the fog, saw that there were only bad chances of landing, was, because we naturally had a goal to reach, and we thought conditions would improve further north.

Back to the choice of type! In clear weather, especially in sunshine, one can see from overhead unevennesses on a place, even when one cannot be certain that all is clear, as the snow may have " covered in " some banks of drift-ice. If the weather is hazy, even a voluntary landing is a matter of chance, for it is impossible to see even the biggest undulations in the snow.

There are three kinds of under-carriages to choose from—skis—floats—or flying-boats. If one has chosen

Riiser-Larsen Before, During and After the Flight

skis or floats, and should strike against a projection with them, tearing off the underpart, the machine will turn over, and a continuation of the flight with the same machine will be impossible.

A flying-boat, on the contrary, has fewer sidewise projections (which means that it would be less exposed to the danger of being damaged by unevennesses), and, furthermore, it will not capsize so quickly. If one has also ordered it of durable aluminium it will afford the uttermost safety. Where a big strain would tear the bottom of a wooden boat (making reparation impossible, or at least very difficult in the conditions prevailing up there), under the same strain durable aluminium would only suffer some denting which could be straightened out again if it proved sufficient to hinder progress. Aluminium does not break so easily.

There were also other reasons that counted in making the choice of a type of boat. Should one have the intention of rising from deep snow, the burden (of the boat, or the machine's under-carriage) lying on the snow must not be greater than a certain weight on the flat, namely, 600 kilogrammes per square metre.

As our machine would average a weight of six tons it was a simple matter to calculate that we must lie on an area of at least 10 square yards, and even then it would be bearing the maximum weight. Thus, a ski-attachment would be particularly heavy, and the floats would have to be unnecessarily large if the bottom's lines were to satisfy the seamanlike desire " to rise from the water."

After making these calculations we were never in doubt, but decided that we should choose a flying-boat built of durable aluminium. With regard to ski-machines we should gain a further advantage in being able to land in, or rise from, possible water-passages, while in a wooden

boat a collision with ice in the water-passages presented a smaller risk.

The point now was to find the *right* dur-aluminium boat, as Dornier was not the only builder of such boats. If one wishes to rise from loose snow it is not only the flat weight which counts, but it is distinctly necessary that the bottom lines of the boat must be so designed that no power shall be lost by the unnecessary pushing aside of snow when gliding forward. There was thus only one type of boat which satisfied our demands, and that was Dornier-Wal.

Dornier-Wal has, furthermore, a distinct advantage which we first became aware of up in the ice regions. It has not got wing-floats to afford the necessary stability on the water, but for this purpose—as shown in the illustration—has attached at each side of the propeller a big "flyndre." During our start from the water-lane the boat sank through the new ice, and a part of the weight fell on the "flyndres." In this way we were able to go to the assistance of N.25 in the capacity of an ice-breaker and help it out of several critical situations. Had there been floats on the wings, too great a weight would naturally have fallen on these, and we should have been unable to avoid damage.

From the above it can be seen that there was nothing else for it but to choose Dornier-Wal for our flight, even though it might have been handicapped by certain failings. I cannot at present mention one single failing, but it had numerous advantages. The best of these in my estimation, is the fact that it is fitted with Rolls-Royce twin-engines (Eagle IX.). I should scarcely have agreed to undertake a flight of this kind without a Rolls-Royce. It is not a matter of "chance" that made Dornier fix Rolls-Royce engines to his Wal type: it would have been bad policy to put anything but the

very best engines in a flying-machine of the "Wal's" high standard.

It will also be noticed from the illustrations that the "Wal" is fitted with two engines, and that these are placed immediately behind each other—one pulls and one pushes—thus the aft propeller turns contrawise to the fore propeller, each rotating in its own way. The wonderfully effective qualities which are thus attained, in conjunction with the suitable lines and ingenious "wing-frontage," make it possible for a weight equal to that of the machine itself to be lifted. As we started from King's Bay we had a load of 3,100 kilogrammes, but the "Wal" itself weighs 3,300 kilogrammes—yet the machine rose with such ease from the ice that I am sure we could have taken an additional 200 kilogrammes on board. This very fact seemed most apparent during the hardships we underwent in the ice regions, when we thought longingly of how many boxes of biscuits, or how much tobacco we might safely have brought with us. We always closed these ruminations by a unanimous agreement, that it was a good thing we had carried no more with us than we actually *had* brought, for a heavier load might have demanded more revolutions from the engine.

The fact that the "Wal" had twin-engines gave us greater confidence in it. In view of the situation of each engine it is possible with a "Wal" to fly with one engine alone, with a heavy load on board, much more easily than if the engines had been placed by each wing, as they are in many other twin-motor machines. With a light load on board a "Wal" can rise quite easily from the water with one engine alone.

Our machine was built by "S. A. I. di Costruzioni Meccaniche i Marina di Pisa," with only a few unimportant differences from the usual Dornier-Wal. We

owe a deep debt of gratitude to the factory's technical director, Herr Schulte-Frohlinde, for the great interest he showed in our expedition. The Director accompanied us to Spitzbergen, and superintended the setting up of the machines. In all he spent three months of his valuable time on us. We, who otherwise would have been taken up with this work, could now (while the work of mounting was proceeding) give ourselves up to the completing of other tasks.

We also owe much gratitude to the Rolls-Royce factory. They sent five men to Marina di Pisa to introduce certain new improvements and inventions which they had hardly had time to " try out," and they also sent Mr. Green with us to Spitzbergen. Mr. Green superintended all the trial flights, and cared for the engines as though they were his " darlings." As he (after his final inspection on the 21st of May) smiled and nodded in answer to my request to be told if all was in order, I set off at full speed feeling just as safe as if I were only going to cross the waters of the fjord.

Measures against the Cold

The oil-tank on a Dornier-Wal stands with one of its sides outside the engine-gondola's wall. This side is furnished with cooling-ribs, for cooling off the oil. On our machine the tank was designed right into the engine's gondola and therefore any cooling off was unnecessary. In addition to this capsules were built over the motors so that the heat from the engines could be kept in the gondolas without cooling down like the temperature outside. All the pipes were bound, many times round, with linen strappings. Certain pipes had the inner layer of bindings of *felt*. This provision was made both as a means of isolation from the cold and to

prevent "burst pipes." Experience here in Norway and in other lands shows us that most motor trouble on a long flight originates in one or other of the pipes. The motor conducts itself well generally. Truly I have seldom, if ever, seen a motor-construction so free from vibration as on our machines, and therefore there was little possibility of burst pipes. As a safety measure, I regard such binding, all the same, as necessary. To the cooling water we added 4 per cent. pure glycerine and thus had a mixture which would not have frozen before we had −17° C., and we had not such a low temperature up in the ice regions. All the same we took the precaution of tapping the water down on to one of the petrol tanks whenever it was not necessary to be ready to start at a moment's notice. By a special contrivance we could pump the water direct from the tank into the radiator again. We generally started the engine first, then pumped the water up. I should like to explain why. The lower part of the intake-pipe was encompassed by a water-cap through which a smaller quantity of the cooling water is led for the purpose of warming the pipe. When the propeller starts to turn, petrol begins to flow, lowering the temperature in the petrol pipe considerably below atmospheric temperature. The walls of the water-cap take on the same low temperature immediately. If the cooling mixture at this time stands at a temperature which is barely a few degrees above water's freezing point, one runs the great risk of there being so much freezing that the exhaust of the cap will be blocked. If this occurs the cap will in one moment become a solid block of ice, causing the sides to burst in consequence. Should one, on the contrary, start the engine first and fill up, the cooling water will thus, in its passage through the cylinders, be so warmed when it reaches the cap, that this calamity will be avoided.

As indicated above, we do not tap the water when we must be ready for an immediate start. In order to keep the temperature in the motor gondola so high that nothing should freeze, and the engines at the same time should be absolutely ready for a start, we used the Therm-x apparatus. This is the first time I have learned that this apparatus bears this amusing name ; hitherto I believe it was called " Thermix." (That is what we called them up in the ice and that is what we are going to call them henceforth !) This apparatus was constructed specially for us by the Société Lyonnaise des Chauds Catalytiques, and was made in a size and form suitable for placing under the engines, or under the oil-tanks. Their manner of action was, otherwise, exactly the same as the ordinary Thermix apparatus. We had six apparatus in each gondola and could thus, in a short time, raise the temperature to 35° above atmospheric temperature.

In the early days, " up in the ice," we took the Thermix apparatus down in the mess when the cooling water was tapped off. They warmed the place up so well that we found it really pleasant and comfortable. In the evening, when we separated to go to bed, we divided the apparatus amongst us in the three sleeping compartments, and there we slept in a little paradise (as compared with the later times), when of necessity we had to economize, even in the small quantity of petrol which they used. There, we hung our frequently soaking-wet socks, goats' hair socks and shoes, directly over the apparatus to dry. I remember still how comfortable it was to put on the warm dry footwear in the morning. During the time that we were not able to use the Thermix apparatus we had to lay our stockings on our chests, when we went to bed in the evening,—a not too comfortable proceeding. The high temperature we were

able to keep up in the body of the plane, when we had the apparatus going, prevented the machine from freezing fast in the ice. There was always a tiny little puddle outside the body of the machine.

In order to be able to warm up the motor and the oil with the help of these apparatus, it was necessary that we should start the engine, screw out the sparking plugs in each cylinder, warm it up well, and set it ready for starting again. This prevented moisture gathering on the plugs. To help to get the petrol warm we ran along the petrol pipes with a large soldering-lamp to help to make the petrol flow easily. On account of these preparations we never had starting difficulties; the engines started at once.

In case the petrol might be thick and slow in flowing, we had brought with us a quantity of naphtha, with which to spray the cylinders. We never needed, however, to make use of it.

The radiator was equipped with blinds, with which we could regulate the radiation. They were of untold benefit to us. When the blinds were fully barred, it took much less time to warm up the motors before attempting to start. We used thus less petrol for warming up. To get the greatest possible power out of the engines, we could, by regulation of the blinds, keep the temperature almost at boiling point at the start, damping down later by opening the blinds wider.

That the compasses were filled with pure spirit, and not with the spirit mixture, was of course a necessity. The same referred to the levels and the water levels. Even though oil might not have frozen in the event of our having had an oil level, it would in any case have acted too slowly in the cold atmosphere. Moreover, all the movable parts of our instruments, which were designated for use in the cold regions, were smeared with a

special kind of oil, which had been tested in a temperature of −40° C.

In my portion of the book I must make special mention of the pilot's rig-out. For flying in a cold temperature, it is of the greatest importance that the pilot, who must sit still the whole time, should be warm and appropriately clad. It is easy to find the most beautiful heavy leather suits which can withstand every attack of cold and frost, but it is not so easy to find garments which are appropriate for all circumstances. Even though the pilot has to sit still he must have freedom to move about without his clothes handicapping him. They must, in all respects, be easy and pliable. What is most important is that they should be absolutely suitable for any work which may be needed before the start. I shall try to explain why a little more intimately. There will always be one thing or another to be done immediately before a start is made, and as far as we were concerned we might have to land to take observations at any time, and start off again immediately afterwards. If, during such a landing, we kept on all our flying clothes as we moved about the ice, we should quickly become much too warm; our under-clothes would become clammy, causing us to shiver when we should once again rise in the air. Had we only one heavy outer set of clothes, and we took it off for any reason, we should risk taking severe cold, and would start flying again thoroughly chilled. Our outer clothes were therefore arranged in several piles, so that without waste of time we could take them off or put them on again to suit the temperature, according to whether our work was strenuous or not. Our under garments were presented to us by the Norske Tricotagefabrikanters Forening. They were made after we had had a conference with one of the manufacturers, H. Meyer, Jun. Next the skin we

wore a quite thin woollen vest and a pair of pants of the same material. On the top of these we had a pair of heavy pants and a vest of Iceland wool. Then long trousers and a jumper, with a woollen helmet to pull over the head. Rönne had made these suits, which were of a thin, comfortable, wind-proof cloth (a present from A/S William Schmidt, Oslo). This was our working kit and also our ski-ing rig-out, intended to be worn should we eventually have to set out on a march to reach land.

The flying suits were composed of a roomy jacket and long trousers of thin pliable leather with camel hair outside. The leather suits were presented to us by the Sporting Outfitters S. Adam, Berlin. On the top of these we wore a sealskin *anorak* (Eskimo jacket with peaked hood). This outfit was made absolutely to accord with the demands of the afore-described conditions.

On our heads we had a leather-lined flying-helmet. Should this not afford sufficient warmth, we could draw the *anorak's* hood over our heads. In order to have glasses which would be suitable for any possible condition we had taken with us a pair of ordinary spectacles with clear glass. At the side of the pilot's seat hung a pair of goggles and a pair of sun-glasses ; also a mask with which one could cover the greater part of the face. However, as we sat well protected behind the wind-screen, we never required to use the mask. I might mention in conjunction with all this, that we took advantage of the opportunity to discard shaving, from the first day.

Round our necks we wore a big woollen scarf, and on our hands a pair of specially made gloves of double pig-skin, with wool both inside and out. Over these we drew a pair of gloves, of thin wind-proof material, which went right up to the elbow, where they could be drawn up and tied. Roald Amundsen will have told

you all about the footwear, but, in conclusion, I should like to point out that anyone could fly in this kit daily in the most severe cold.

Progress is distressingly slow in this account of mine. To-day is the 3rd of August, and up till now I have only written 4,000 words. That is scarcely 1,000 words per day. I shall have to triple my speed and push forward if I am to finish with my task in time.

As I sit and fag over the work of writing, and get irritated over the difficulties which present themselves, I comfort myself by repeating the words of an English Admiral: "Good writers are generally rotten officers."

I see, moreover, from to-day's newspapers that they wish me to be a member of a new North Pole expedition next summer. In view of what I am going through at the present moment I almost believe I shall "decline with thanks."

Spare Parts

Spare parts for the machines and engines, presented an important consideration. Spitzbergen lay so far away from the factories which had made the material, that we could not have any missing parts sent after us. So, as far as the engines were concerned, we decided to draw up a list of the spare parts which we should most likely need. As an engine is made up of so many different parts, the best thing to do, it seemed to me, was to order one complete reserve engine. We should thereby have the certainty that in every event we should have at hand *one* reserve part for the complete engine, no matter which part should suddenly be required. (By chance we came to need a reserve part, which we never had thought about!)

"Rolls-Royce" also made up a list of the parts

which they thought we might need *more than one of*, and thus we got an extraordinarily fine equipment. We had in all, engine spare parts to a value of 38,000 kroner. We should not have been able to get this equipment had not the Rolls-Royce people shown us the great consideration of agreeing to take back everything which we had no use for. We were in a similar position to most expeditions, and had great financial difficulties to cope with. I mention this as everyone here, at home, seemed to think that Ellsworth's gift of 85,000 kroner would suffice for our needs. But that was not the case. The two flying-machines together cost 82,000 dollars, and on these alone the money was almost all spent. When the expedition's accounts are totted up, I believe that they will show a sum of at least 100,000 dollars in excess of Ellsworth's gift—and *that*, even after we had pinched and spared on every side. Against this we can reckon with a certain income from stamps (this cannot at present be estimated), and the expedition will also have an income from newspapers, films, lectures, and this book, all of which combined, should cover the debt of this necessary 100,000 dollars. The essential part of the expenses all came before the start, but any income only accrues some time after our return. The position at Christmas time last year appeared very unpromising, and the outlook seemed hopeless. The till had long been empty. Yet orders must be placed if everything was to be ready in good time, and everything had to be paid in ready cash. Bills streamed in, followed by demands for payment whenever they were not settled at once. But where were we to get the money ? It is satisfactory to look back, now that everything has been accomplished, but it was far from pleasant at the time. Our private household bills got very, *very* old,—*so* hard-up were we !

Dr. Ræstad, who had the financial management of the undertaking, worked on through these conditions quietly and calmly, and he was lucky in being able to carry through a task, which probably no one else could have accomplished. Thanks to him we were able in April this year to have everything collected in Tromsö, ready for our departure for Spitzbergen, so that after looking through our equipment we were able to say: "There isn't one thing missing."

Up till now only the returns from the newspapers have come in. We have, therefore, an alarmingly large overdraft at the Bank. As the account is so overdrawn we have still difficulties to face and must therefore set about the fulfilment of our many obligations. We can now look forward to a time when our income will be sufficient to pay off our overdraft, and leave a balance, which will be used for the realization of Roald Amundsen's old plans.

It is on that account that I have taken this opportunity to write about the financial side of the expedition. There are a number of people who think that we have become rich folk. How often have I not been congratulated—not only because I have come back with my life, but also because I have returned as a millionaire. Probably the films shown in this connection have given this impression. But people should realize that we are at the mercy of the big film companies who fix the price. If we ourselves had cinema theatres stretching through the world's towns, then could Roald Amundsen set out to-day on the realization of his wonderful plan: the exploration of the sea between the Pole and Alaska.

Back to the matter which I am really discussing. The same goodwill met us in Marina di Pisa, when Director Schulte-Frohlinde himself made out the list

of spare parts, assuring us (by giving the matter his own personal attention) that we should have with us every article necessary for the flying boats' requirements. The bill for these spare parts ran up to about 28,000 kroner.

INSTRUMENTS

During his preparations for his earlier flight, Roald Amundsen was struck with the idea of using a sun-compass, and arranged with "Goerz Optische Werke" to construct such an instrument. The firm met his suggestions in the most friendly manner, and the result was our invaluable solar-compasses. The principle of these is as follows :

The sun's reflection is cast through a periscope down on to a dull disc, directly in front of the pilot. By the side of the instrument there is a clock, which can be coupled to a cog-wheel on the periscope. The clock is constructed so that it can swing the periscope round 360° in the average time that it takes the sun to perform a similar movement. By the aid of a graduated scale on the periscope, which can be placed at a certain angle, one can set it in agreement with the flying-boat's nose. Should I, for example, start exactly at midday, I should set the periscope so that it points direct astern. Exactly at twelve o'clock I attach the clock to the instrument. Should the seaplane now by chance face the north, I would see a little reflection of the sun in the centre of the dull disc, which is marked by a cross. The periscope will now follow the sun's course, so that the reflection will always be in the centre of the disc, as long as the seaplane continues the same course.

Should it be set working at another time, it would be calculated from the angle of the sun, at that moment

when the clock is set going. The clock is always regulated according to Greenwich time (or any other recognized time), but the longitudinal distance must be taken into account, and in the same manner the angle must deviate away from the meridian beneath, if one does not desire to steer parallel with it. On the top of the periscope there is a screw, with an inner part, where an adjustment can be made according to the declination on that day. The solar-compass is mounted on a base on which can be made corrections for eventual latitudinal changes. The periscope's axis must always stand parallel with the earth's axis. A change in the upward tilt of the machine must also be reckoned with.

The lenses in the periscope are constructed to give a radius of 10° ; that is to say, if the sun's reflection appears in the disc's outer edge, one can allow 10° before it disappears in the other outer edge. If one has set the solar-compass for a flight direct north, one will continue in the right direction so long as the flying machine has no deflection. In order to detect such deflections we have a combined speedometer and deviation-measure which was also given to us free of charge by Goerz. Amundsen attended to these on the northward journey—Dietrichson on the southward. They both speak of them with high praise. Their uses are shortly as follows : Inside the instrument, on a movable ring, is fastened a diametrical wire. One looks through the instrument down on to the ground below, or on to the ice, and adjusts the wire the longitudinal-way of the ship, then pays attention to the objects passing afterwards under the plane (icebergs, for example), noting whether they follow the direct line of the wire or deviate to the side. Should there be a deviation, one knows that they are not following the direct course in which the nose is pointing, so it has to be set at an angle allowing

for the deviation. The wire must be drawn to the side quite slowly, until one finds that the objects which one can notice, now follow the line of the wire exactly. This points now in the direction one comes from, and the wire's angle, compared with the boat's nose, can be read directly in the instrument. That gives the deviation's angle.

One can also leave the wire as it is, and turn the whole instrument instead. The deviation's angle is to be read on the instrument's base. This is the easiest way, as it allows one to get on quickly with measuring the speed. Having calculated the deviation it is not correct to steer against the wind, allowing only a corresponding number of degrees, or it will be found that there is still a deviation, though not so great as before. To correct it, it would have to be measured, then some steering would have to be done, then it would have to be measured again, and so on, before it could be regulated. It is therefore better to come to a quick and exact result by quickly taking the speed measure. This is done by the same instrument, by watching an object pass between four points of the scale as the machine goes over it. The pilot continues to fly in a steady course during the entire observations. The navigator sets a stop clock going when an object passes the scale at the point opposite 45°, and he stops the clock when the object passes zero, as it will then be centrally under the machine. The altitude, above the underlying territory, is read on the altimeter, and by aid of this and the stop clock's indications, it is possible to calculate correctly the speed over the ground-distance covered. We have now got the following particulars: The speed through the air which the speedometer shows, and which is called the air-speed; the steering course through the air, which we will call the air-course; the speed over the ground,

which we will call the ground-speed, and last, the deviation's angle. These calculations have to be worked out in conjunction with each other, on a calculating machine, showing in a second what steering-course shall be adopted under the existing wind conditions, to carry the plane in the desired direction. In addition to this there is a further enlightenment, showing the exact direction and strength of the wind at that altitude.

The pilot announces if a new course shall be steered. If he steers according to the solar-compass, the navigator adjusts the solar-compass, by turning the periscope a corresponding number of degrees.

So long as one need not fly over clouds or fog all goes well. With steadiness it is possible to control the course over the ground and steer the plane straight to the Pole by territorial navigation. During the two first hours, after we had passed Spitzbergen's north coast, we had thick fog under us, and got no drift observations. As soon as we could get these the solar-compass was corrected. We had, however, in the meantime deviated so far westwards that the indicator pointed well over to the west side of the Pole. One must pay particular attention to the fact that the solar-compass only indicates a northward direction so long as one is on the same meridian which the compass was adjusted to. If one has deviated to the side and continues to steer according to the solar-compass, one will set a course directly parallel with the meridian for which the compass was adjusted when starting. For a new adjustment of the compass, so that it points towards the Pole, one must in every case take the bearings. Both during the northward journey and during the homeward flight the solar-compasses were of the utmost benefit to us. Without these, and depending only on the magnetic compasses, we should have been very much less confident. The selection of

our magnetic compasses was only settled after we had studied the various types most analytically, paying particular attention to the conditions which they would have to answer to, in the Arctic Ocean.

I should like here, to mention a common mistake, founded on a popular idea, that the *Magnetic* Pole lies at the *North* Pole. The globe is a great magnet which has two magnetic points, a North Pole and a South Pole, and fortunately the Magnetic Poles do not lie in the same places as the geographical poles. The earth's magnetic South Pole, which draws towards itself the compasses' *North*, lies on the north coast of Canada about 70° N. and 95° W. Lgd. In general this is called for convenience the magnetic North Pole. Its position, as is well known, was verified by Roald Amundsen during the Gjoa expedition.

Looking at the map, it will be discovered that the magnetic pole lies about an equal length from the geographical North Pole as from Spitzbergen. Therefore it stands to reason that the compass which can be used in Spitzbergen can therefore be used in the fairway from there to the Pole. The one thing which might cause us moments of misgiving was the magnitude of the compass's variations in the district we wished to reach. (There is little data resulting from exact observation to give us the reason of these variations.)

During a visit to Bedford, Dietrichson and I discussed this part of the enterprise with one of my English airman friends, Captain Johnstone, and we are most grateful for the assistance he gave us. The result of the discussion was that we chose a steering compass as well as a standard compass of an up-to-date type made by the firm of Hughes & Son, London. These compasses are made to repel movement, and to bring the needle slowly back to its correct position without the slightest oscillation

either to the right or left. In the Arctic Sea, where the horizontal component of the earth's magnetism is proportionately weak, it must always take time for the needle to swing back into position, as it is so strongly repelled by existing conditions. But we preferred this, to one with a lengthy oscillation and a big swing backwards and forwards. Steering compasses of the above kind are eminently suitable, on account of a special construction, which it will take too long to describe here. The standard compass was excellent. The magnetic condition in the navigation compartment was also ideal. The deviation's co-efficiency was shown, by the readings we took, to be so trifling, that we could consider our compasses free from deviation. Just before leaving Spitzbergen we had one of the German Ludoph-compasses sent to us, with a request for us to give it a trial. I placed it in the pilot's compartment of N.25, where it proved itself to be an excellent compass. If the machine heeled over the dial also took a certain tilt and the vertical component of the earth's magnetism caused considerable oscillation, as the natural result of its great attraction. Whilst the Ludoph-compass oscillated somewhat, the other took some time to swing back, making it impossible for me to say which I preferred. I steered with both of them, controlling the one by the other. During the homeward flight I continually steered by the magnetic compasses, and had no difficulty so long as I could have a " Landmark " ahead. During the fog it was not such an easy matter.

A/G Gyrorector, Berlin, kindly placed at our disposal a gyroscopic apparatus for each machine—as a loan. This instrument commended itself to me and is the best I have seen hitherto for flying in fog or darkness. The rising and tilting indicator was of use to me during the whole flight. The conditions, however, were such

that I did not have to make great use of the direction indicator, beyond the fact that on the northward flight I experimented with it, in case we should find it necessary at some time to make a forced landing in the fog. The arrangement between the two planes was that at all costs, if we should pass through fog, not to get separated from each other. At the close of the homeward journey, as mentioned elsewhere, we flew into such thick fog that I could have made use of the direction indicator. We flew, however, so low there, that the whole time I had to keep my eye glued to the ice beneath and in front of us.

We had ordered a wireless installation for N.24, but went without it as it was not ready in time. It was the only thing we went off without. We never missed it. I might mention here that we had laid down a principle not to wait at all for any belated goods.

Seeing that so many different suppliers, at home as well as abroad, should dispatch the goods in time to reach Tromsö, to be loaded by a certain date, I got endless notices to say the goods would be belated, and that we must put off our flight some days. The answer was always the same: "We shall go without goods if they have not arrived." The result was, except in the case of the wireless, that everything was delivered in good time. Had we once started to put off our departure we should have had constant delays.

NAVIGATION

It will, perhaps, interest those readers, who have a knowledge of navigation, to hear a little more about Sverdrup of the *Maud's* cleverly calculated but simple methods of navigation in the Arctic Sea. I repeat word by word Sverdrup's own well-known description:

"One single measuring of the sun's altitude shows that one stands on one particular spot, in a small circle whose centre is the point where at that moment the sun has reached its zenith, the radius of which is 90°h. (h. indicates the measured height of the sun). This circle shall be called a local circle."

In order to find the meridian the sun would be in, at the exact moment of observation, one must read a clock, the agreement of which with Greenwich mean time (G.M.T.) is known. An almanack gives the time level to be added to, or subtracted from, G.M.T.—giving Greenwich true time (G.T.T.). The sun would then be over that meridian, the latitudinal difference of which from Greenwich is equal to the time taken for a clock to strike, according to G.T.T., and would be in its zenith over the point, the breadth of which, is equal to the sun's declination.

Taking an observation of the sun's altitude, with a simultaneous noting of the clock's striking, can be done most rationally, by describing a tangent from a local circle, in the neighbourhood of the place where one believes oneself to be. Such a tangent should be called a local line. In the neighbourhood of the Pole it is easy to find local lines without scientific calculations. The meridian the sun is in can be found directly one has calculated the clock's stroke, by G.T.T. The local circle cuts the meridian in the distance h. — d. from the Pole, where d. signifies the sun's declination. This cutting point we will call the local circle's Pole point. If the difference h. — d. is positive, this point will be on the same side of the Pole as the sun ; should it be negative it will be on the opposite side. A line dropped on the meridian which the sun is in, through the local circle's Pole point, describes a tangent from the local circle. We will call this tangent "the Pole tangent." At a

THE "GOERZ" SUN-COMPASS

distance from the Pole point equal to 5° of latitude, the Pole point will represent the local circle with sufficient exactitude, and can be considered as a local line. But if the distance increases, the tangent's divergence from the circle will be noticeable. Sverdrup explains how, by an easy method, one can calculate the corrections which have to be made, should one find oneself within the above-mentioned limits from the Pole. During our observations in the ice region we were always within the limit, and had therefore no need for corrections. The method is, of course, particularly simple and sufficiently exact, because there is so little difference between the hour-angle and azimuth. I here give a table of our observations on the night of the 22nd immediately after landing :

Clock readings :	3h. 23′ 3″	Sun's lower rim	
Error :	1h. 0′ 19″	from the imaginary horizon	
G.M.T.	2h. 22′ 44″	measured	35° 58′ 2″
Time level +	3′ 33″	Half of this	17° 59′
		Mistakes : 0	
G.T.T.	2h. 25′ 17″	Corrections +	13′
Converted into degrees :	36°3	Sun's centre correct altitude	18° 12′
		Sun's declination	20° 15′ 4″
		h. — d.	2° 3′ 4″
		Converted into nautical miles	123.4

On a chart we drew a line representing Greenwich meridian, and a point on that was selected as the North Pole. The angle 36° 3′ was set from north to east and

the sun's meridian drawn through the North Pole. From the last-named point towards south-west we marked out 123.4 nautical miles; as the h. — d. was negative we drew the local line straight up to the sun's meridian.

Hereby we had the line on which we stood, and must wait until the sun had changed its position to complete our calculations. The cutting point between the local lines would give our position.

According to G.T.T. 5h. 47′ we took an observation in the morning which gave h. − d. ÷ 33 nautical miles. These observation lines were constructed on the same chart, and the cutting point gave us our position 87° 47′ N. lat. and 13° W. lgd.

Some days later we used these data as examples and recalculated the same observations according to the method of St. Hilaire, and thereby found that our landing point lay on N. lat. 87° 43′ 2″ and W. lgd. 10° 19′ 5″.

After our return our observations were again recalculated according to absolutely exact astronomical formula by Cand. mag. R. Wesöe, under the guidance of Professor Schroeter. According to their calculations the most northerly point turned out to be N. lat. 87° 43′ and W. lgd. 10° 37′; the very spot where we had our first camp. During reconnoitring we went further north, but without taking observations. In addition to this Cand. mag. Wesöe calculated the positions as follows: I herewith give four:

1925. 22/5	N. lat.	87° 43′	Lgd. W.	10° 37′
28/5	„	87° 32′	„	10° 54′ 6″
29/5	„	87° 31′ 8″	„	8° 3′ 9″
12/6	„	87° 33′ 3″	„	8° 32′ 6″

These positions give an idea of the drift of the ice easterly and southerly.

SOUNDINGS

We could see that it would be a matter of great and special interest if we could take soundings where we landed, and discussing it fully, we came to the conclusion that we ought to be able to get sounding materials with a reasonable weight. We got into communication with the Behm Echolot Factory in Kiel, and all our difficulties were immediately brushed aside. After I had been to Kiel, and talked over the matter with Herr Behm, an excellent apparatus was made and placed gratis at our disposal. As there were great depths in the district where we were to land, it was not necessary to take the depth to the nearest metre, but we could make an approximate registration. The weight of the whole sounding equipment, with cartridges for a number of charges, was cut down to a few kilogrammes. There was, therefore, no obstacle in the way of our taking it with us in the flying-machine—and we could also have taken it with us even had we had to make a march towards land.

The principle was simply as follows. A water-tight microphone was sunk about four metres down in the water of a crack in the ice. The microphone was attached, by a line, to an ordinary head-microphone, which the observer wore. At a distance of 25 to 50 metres from the observer a little charge was sunk under the surface; it contained 10 grammes of trinol and was provided with a detonator. The charge was exploded by an electric spark. The observer set a stop-clock going when he heard the explosion, stopping it as soon as he heard the echo from the sea bottom.

On May 28th we took two soundings immediately after each other, and in both cases the stop-clock's

time proved to be five seconds. As sound travels in sea water at the rate of 1,500 metres per second, the distance from the surface down to the bottom and up to the surface again is equal to 7,500 metres, and thus the sea's depth is at this place half the amount, namely, 3,750 metres. The echo was quite sharp and not to be misunderstood. Therefore during a later drift, as we did not move far from the place where we had taken the first sounding, we took no more. We wished to reserve the spare charges for a possible march.

VARIATIONS

For the exact taking of the sun, the standard compass was equipped with a special finder in the same way as there were water-levels on the compasses. The compass was placed in the best position where it would be as far away as possible from every object likely to influence it. Observations were taken on the 23rd and 29th of May, with the results respectively, 39° 5′ and 30° westerly variation. This is about 5° more variation than the chart allows. These observations proved to be of great use to us when we started the homeward flight. By calculating with these variations in arranging our starting course we found we had achieved an important measure.

I will now briefly give particulars of our further equipment.

Photographic materials and binoculars, etc., were given to us by Goerz, the cinematograph apparatus was a gift from the " Hahn Aktiengesellschaft für Optik & Mechanik," Berlin. The films and plates for the camera, also the cinema films, were given to us in generous numbers by the " Goerz Photochemische Werke," Berlin.

The Speedometers and Deviation Measures.

It is quite unnecessary to mention, that all the things given to us by these firms, were of first class material, and everything functioned to our greatest satisfaction, giving excellent results in spite of the difficult conditions. Our snow glasses were a present from the firm Optikus, Oslo, and were specially made for us. They could not have been better. When I count them as amongst the most important part of our outfit, I have good grounds for doing so. Anyone wishing to choose glasses, and looking through the different types, will find that there is a tremendous difference between them, both as regards suitability of colour and other things.

There is a small detail which I should like to mention in this connection. Many flying-men will have gone through the same experience as I, and realized how unpleasant it is, to fly towards the sun when it is at a low altitude, for, blinded by the sharp light, it is difficult to see the instruments, and in many ways it causes a continuous strain. As a deterrent we had small aluminium screens, made in the same shape as the wind screen. These could be fixed as desired. At 10 p.m. on the northward journey the sun was so dazzling that I placed the screen in position, leaving it there until at 1 a.m. I began to look out for a landing-place, when I pushed the screen back, feeling satisfied with its utility.

From the ski-factory " Johansen and Nilsen A/S., Fin Schiander," we received the present of the most beautiful ski-ing equipment that anyone could wish for—skis with staves, and ski-sledges. On the old ice the snow lay so deep, that without the skis we should have sunk in well over the knees. Had we to cross the water-lane to fetch provisions and petrol from N.24, we were forced in many places to cross new ice, which was in such bad condition, that it would not have borne us

unless we had worn skis. For transport we made use of the ski-sledges. The transport of the 200 kg. heavy petrol cans over the ice was, for the sledges, a hard test, which they successfully passed. (It was with intention, that we did not spare the sledges from the greatest strain, during these transportations. We learned, therefore, by experience, what we could safely expose them to, in the event of a possible march towards land, during which we would have to avoid all possible loss of time, caused by having suddenly to unstrap the sledges, if we had to cross over icebergs.) Had the sledges been affected adversely by these tests, we had the means at hand for repairing them. It would have been much worse if they had failed us during the march. The sledges, moreover, were made with a wide surface, so that the canvas boats could stand in an unfolded position, "all clear" to be put into the water-lane in the shortest possible time that necessity might demand. As the boats in this position had to be protected against jagged ice on the icebergs, we would have had to cut aluminium plates away from the flying boats' bottoms before we left —using them as a protecting screen for the canvas boats.

The reins and harness were made by Rönne, designed in such a way that they could be placed both on the hips and on the shoulders.

We took, for our cooking needs, two kinds of stoves; namely, the Meta apparatus and the ordinary Primus. When I say *ordinary* Primus, it is not quite correct. It was really extraordinary, so far as quality and utility go. The Meta apparatus, with plates, was a gift from the factory's Norwegian representatives, the Brothers Klundbye, Oslo, in the same way as the Primus was a gift from the Christiania Glasmagasin, Oslo.

The Meta apparatus was used by us for cooking,

during the time when we were divided into two camps, but afterwards, when we were reunited (making six in all), we found it more convenient to use the Primus.

In the way of weapons, each flying-boat had one gun for big game, one shot-gun for fowl, and a Colt pistol. The last named we had taken in case of a chance visitor coming to the tent in the form of a Polar bear; the pistol was also a lighter weapon to handle than a gun. We had seen on landing that there was animal life in this district, so the guard always carried a pistol on his nightly round. Polar bears are not quite such friendly creatures as people are inclined to believe, and so far north as we were, they would most certainly be of an exceedingly hungry type. However, during the whole expedition, we did not see a single one.

It was fortunate that we had taken pistols with us, for we found that all our heaviest things had to be jettisoned to lighten the load, and we came to the conclusion that if the worst came to the worst, after letting the heavy guns go, we at least had the pistols left.

We had two kinds of smoke-bombs with us. A smaller kind for throwing out on to the snow immediately before landing, to show us the direction of the wind. A larger type had been brought for the following purpose. We thought there might be a possibility of one machine having to make a forced landing and that the other might have to search for it, while trying, at the same time, to find a suitable landing-place. To aid the crews in finding each other, these smoke bombs were really intended. As we had to economize in every gramme of weight, we had to keep the weight of these bombs so small, that they proved hardly big enough for our needs. We used a bomb the first day on board N.25, when we did not know where N.24 was. The wind, however, was so strong that the smoke lay in a long strip over the

snow plains. Had the weather been calm we might have had a more helpful result.

People will no doubt say that we should have tested these bombs before leaving, and had they proved too light, we should have ordered others of the necessary weight. This was, in the first place, our intention, but the order we gave for new bombs was unproductive, and it was only owing to the great kindness of the firm, J. P. Eisfeld Silberhütte (who undertook in the course of a few days to make our bombs and deliver them to us) that we had them at all. I should have felt very uncomfortable if I had started on a flight of this kind, without bombs to determine the exact direction of the wind, in case we might have to make a forced landing in such difficult circumstances.

There has been a lot of talk about the possibility of using aniline for marking the snow, and I should like to express an opinion on the question. We had discussed the possibility of being short of petrol during the return flight to Spitzbergen, and that we might have to land and take all the petrol into one machine, and continue the journey with that one only. If the abandoned machine did not lie too far to the north, we would return later to fetch it. In order to make it easier to find it, our intention was, at certain distances from the machine, to make a number of marks, by throwing out quantities of aniline at certain spaces apart, to mark the course of our continued flight to Spitzbergen. Last winter we made a number of experiments, by throwing out large quantities of the powder at intervals from a flying machine, but got no satisfactory results. During our stay in Spitzbergen we experimented with marking the snow by scattering powder out by hand. The result of this test was, that if the snow was damp or quite wet, the effect was successful. If, on the contrary, there

was frost and the snow was dry, no sign remained to aid us.

The aniline powder requires damp, therefore, before it can fulfil the purpose of marking a track. As we might expect to find these conditions further south in the Arctic Sea, and as we thought of the possibility of making such marks during the return journey, we took with us a small quantity of aniline. In connection with this, we are indebted to the Badische Soda and Anilinfabrik, for the interest, which they and their firm's representative, Erik Berrum (who gave us the idea), took in the experiment.

Our ice-anchors were made by the Factory in Marina di Pisa, according to Amundsen's designs. We had at that time, however, no idea that these would be considered later to be our best tool for hacking the hard ice. As ice-anchors they were also particularly effective. It happened that during the worst of the drifting, we had to fasten the flying-boat, to hold it safe from the encroaching ice. When the ice edges were almost setting together it was not so difficult to hold the nose direct against the pressure. The trend, however, changed in the shortest space of time, so that the one ice-border " set " in an angle directly frozen into the other ; both pressing together sideways, and overlapping like the teeth of a ruminating cow. This was where we found it difficult to raise the boat.

The footwear presented an important side of our rig-out. It might happen that we should have to make a march of many hundred kilometres back again. We were prepared to find that there would be deep mush on the ice as it was the warmest time of summer, and we would often have to take off our skis, for the purpose of clambering over the icebergs and ice-banks. Ski-ing boots were therefore needed, knee-high, with watertight

legs. The long legs made the boots very heavy for anything but ski-ing, for which they proved they were admirably suited, when we tried them in Spitzbergen. For ordinary wear, when we should be resting, in a district where skis would not be of use, each man had an extra pair of boots. We therefore took with us to Spitzbergen many different kinds of footwear, so that each man could choose those, which he considered would suit him best. (If a man has had the opportunity of choosing his footwear, he will find them much easier to wear when on a long march and exposed to hardship.)

In order that we might have the opportunity to form an opinion of our own, we obtained samples of every suitable type. In the accompanying photograph there is a complete row of the different kinds. From the left it will be seen that we had long-legged boots, ski-ing boots (fashioned like the Norwegian *lauparstövler*). These we could either choose or reject. The next in the row are a pair of long-legged *kamikker*, of which we had a considerable choice, as also some with shorter legs. By the side of these, stand boots designed for flying, and they are the kind which Roald Amundsen has described. Beside these, you will see a pair of Laplanders' boots and a pair of Canadian lumber-man's boots. In the foreground lie a pair of long rubber boots.

When I asked Ramm to take a photograph of this miscellaneous footgear—which "we required at Spitzbergen"—he, like the humorist he is, could not let such an opportunity pass without a joke, and therefore placed on the extreme right, a pair of dancing shoes!

The result of the selection was, that Amundsen, Omdal and Feucht chose Laplanders' boots; the two latter because this type of boot was practical when they had to climb from the motor gondola to the tank compartment. Ellsworth and Dietrichson chose short-legged *kamikker*,

The Cat and the Ape.

Our Boots.

whilst I took the long-legged rubber boots. As everyone, during and after the flight, was particularly well pleased, and praised his own selection in loud tones, it goes without saying that the original purpose of individual selection was thus attained.

In accordance with the request of Rolls-Royce, we used Shell Aero-petrol, and Wakefield's Castrol R. oil. We cannot speak too highly of both. The fact that N.25's engine always started instantly, on the many occasions when we had to free the flying-boat from the clutch of the ice, without the use of naphtha, is a credit which Feucht and Rolls-Royce must share with the petrol.

I come now to our provisions. There are many people who do not know what pemmican is, so I shall tell them about it shortly, here. Pemmican is *not* a bird, as several people have asked me—nor has it anything to do with a pelican. The preparation of it is as follows : Beef is dried in the lowest possible temperature, in such a manner that it shall not lose its tastiness. It is then ground to powder. This powder is mixed with dried pulverized vegetables. The whole is mixed together in melted fat, filled into moulds and allowed to set. That this is nutritious fare, is shown by the fact that five kilogrammes of beef make only one kilogramme of beef powder. Our pemmican was a gift from the Danish Wine and Conserves Factory. It was analysed by Professor Torup and was found to be in excellent condition. By cooking it with water the pemmican will make either soup or a kind of porridge, or something between the two like gruel. 80 grammes of pemmican per man made a most delicious cup of soup. In the ice regions pemmican tastes equally good in its uncooked state. The little extra ration of 40 grammes which we got during the last days for the evening meal, we ate like bread, with our cup of chocolate.

The Freia Chocolate Factory made our chocolate, according to a special recipe, and presented us with it. We were, however, unable to follow the Factory's directions, which, inscribed upon the packet, informed us that we should use 125 grammes (one tablet) to half a litre of water. We used a third part of a tablet to 400 grammes of water, and it seemed to us most excellent chocolate. As we later had to reduce our bread ration from five oatcakes, we balanced it by adding Molico dried milk to the chocolate (a gift from the Norwegian Milk Factories). Even now as I write I see again the scene which was enacted each morning. We came creeping out of our sleeping-bags, tumbled to our places in the mess, then sat and shuddered in our clothes as though to dispel the cold, while we rubbed our hands together. The Primus stoves' kindly glow was warm and pleasant ; we bent nearer to them, anxiously looking into the chocolate pan to see if it would not soon begin to bubble and steam. Soon it would bubble up in the middle, and a delightful steam rising from the little pan, came streaming out into the little room and enveloping us. We closed the trap doors to keep the warmth in the mess. The three small breakfast biscuits were passed round to each man ; the cups were filled and sent after them ; six pairs of hands clasped themselves involuntarily round the six cups. (I can still feel the warmth circulating from my hands up into my arms.) Faces were bent over the cups to be warmed by the rising steam, while hungry mouths cautiously and gratefully drank in the chocolate, which heated the body as it glided downwards. After this we started to talk.

Many readers will be asking themselves the question—"Didn't they take any coffee with them?" No, we had no coffee with us, and even if we had had it, it would not have been touched so long as any chocolate remained.

We five "new beginners in the ice," were almost ready to say when we came back, that we should *never* have anything but chocolate for breakfast. We *did* say it in fact, but Amundsen only smiled and reminded us that the moment we boarded the *Sjöliv*, on the evening of June 15th, it was difficult for us to wait until the coffee was poured into the cups.

The oatcakes were also specially made and supplied by Sætre Kjæksfabrik, Oslo. In addition to the specified biscuit ration we should have taken with us, Director Knutsen gave us a box of "Fru Clausen's cake" for each machine. How grateful we were later for these! Not only were the cakes delicious, but they helped us to continue our long and tedious work and augmented our rations in such a way that we were provisioned for some time longer, thereby postponing the possible need of setting off on a march to Greenland which we should have had to do had we failed to start the machine.

In addition to this, Amundsen's good friend, Mr. Horlick, had sent us to Spitzbergen, a supply of Horlick's Malted Milk (malted milk in tablet form). When we felt a little weak we took ten of these tablets per man per day. The intention was, that we should take one at a time, at equal intervals, during the day's course. I began by taking one as I crept into my sleeping-bag in the evening. In a few days I had got so used to these tablets, that I had to get out of my sleeping-bag to fetch another one. This course became burdensome, so I placed the box beside me. Soon I found that I had to take five or six of them before I could stop. They tasted like good sweetmeats, and the next step was to take the box into my sleeping-bag with me because I found it too tiresome to crawl halfways in and out every time I wanted to reach a tablet. The result was, that I could sleep peacefully for the rest of the night. At that time,

if one of us was on guard all night, he got an extra ration of ten malted milk tablets, and could make a warm drink with them which we called " a cup of tea," because it looked like tea with milk in it and because it had a similar taste. We placed an incalculable value on these tablets and felt how greatly they strengthened us.

Our full ration list comprised the following :

Per man.	kilogrammes.
Pemmican, 400 grammes per day. For 30 days	12,00
Chocolate, 2 tablets each, 125 grammes	7,50
Oatcakes, 125 grammes per day (12 cakes)	3,75
Molico dried milk, 100 grammes per day	3,00
Malted milk, 125 grammes per day.	3,75
In all per man for 30 days	30,00

The list of our additional equipment per man :

Rucksack which held a change of underclothes (comprising woollen vests, drawers, pair of stockings, a pair of goats'-hair socks). Matches in a water-proof bag, automatic lighter, housewife, a cup and a spoon, 1 can, tobacco, pipe, diary, telescope and all small personal belongings.

In footwear we had ski boots and a pair of boots of our own selection.

1 pair of skis, 2 staves, 1 set of reins.

Every man should have a clasp knife.

List of " Mutual belongings for Flying-boat Equipment."

1 medicine chest	Smoke-bomb pistol
1 tent	1 lee-way measure

Reserve ski straps
Reserve pig-skin reins for sledges
1 Primus with cooking vessel (large)
1 box, reserve screws, etc., for Primus
30 litres petroleum
Meta cooking vessel with case of plates
1 kilogramme dubbin
Sail - cloth gloves, syringes, large nails and sail thread
1 sextant
1 pocket sextant (for sledge journey)
1 spirit level
1 chart ruler
Navigation tables
1 log-book
Pair of compasses
2 T squares
Pencils
Binoculars
1 canvas boat
1 sledge
1 solar-compass
1 shot gun with 200 cartridges
1 rifle with 200 cartridges
1 Colt pistol with 50 cartridges
1 electric pocket lamp
Motor reserve parts
Motor tools
1 axe
1 snow shovel
1 rucksack
Ropes
1 ice anchor
1 reserve ski pole
1 petrol bucket
1 petrol funnel
1 oil funnel
1 kilogramme aniline
1 half sack senna grass
Ski dubbin
3 pilot balloons
3 pairs of snow-shoes
6 large and 4 small smoke-bombs

On account of weight we were debarred from taking any reserve ski equipment with us. In the event of our requiring new ski parts before the end of a march, the sledges were arranged with a lower part like skis, which could be detached and rigged out as skis with reserve strappings. The idea was that towards the end of such a march, everything could, in the event of trouble, be

put on to one sledge, leaving the other free for us to dismantle and use. Should any misfortune occur at the beginning of the journey, we should be in a much worse position. For such an eventuality we took snow shoes with us.

Of these we could take a generous number, as they weighed so little. Strange to say, we did meet with a misfortune. Dietrichson lost both his skis, and one of Omdal's, which he kicked off, fell through the ice and disappeared in the water, being carried away by the current.

With the weight divided equally between the two machines we had the following load :

1 large and one smaller cinematograph apparatus.
600 metre film.
2 cameras with films and plates.
1 petrol pump with long hose.
Behm sounding apparatus with charges.
Arctic maps.

The next thing I am going to write about is :

The Transport of the Machines from Italy to Spitzbergen

The name of the ship broker, Axel B. Lorentzen, should be inscribed at the beginning of this section of my story, in large capital letters. Without his help I don't know how things would have gone. The work we first set about was to find a means of conveying our large machine cases and all our extra equipment from Norway to Spitzbergen. Considering the time of year it was necessary that we should have a ship which could cope with the ice conditions. Should we charter any other kind we should risk incalculable delay. Out of the six large crates, the engine cases must, in every event,

find room in the hold. It was out of the question for these to be stowed on deck. Lorentzen got for us the "blue-prints" of ship after ship, and I sat at home for hours studying the plans and working out the dimensions of the cases and the hatches. In the end we got a sketch of the *Hobby*, just when I had almost given up the idea of ever being able to get the motor cases down into the hold, for it seemed that the only way would be to take the engine gondolas out of the crates, and at least stow *them* safely in the hold. In the case of the *Hobby*, from the figures given, it appeared that the crates could just be passed through the hatches and lowered. Our joy was great. The four other crates could be stowed on deck, so we chartered the *Hobby* to be taken over on the 5th of April.

We had believed that it would be an absolutely simple matter to get the machines home to Norway from Italy, but we had miscalculated. We learnt this very quickly! The regular lines went to ten or twelve different ports taking on board parcels here and parcels there. Therefore this means of transport was of no use to us. A Dutch line offered to take the machines for 50 per cent. of the ordinary freight to Amsterdam. This was very tempting, but we should be under the necessity of transporting them to Rotterdam in order to join the ore-boat leaving for Narvik. We tried also other ways, but without result.

Then came Lorentzen one day and brushed all our troubles aside, as he said: "All we have got to do is to arrange something for ourselves."

He calculated that if a boat of the size of the usual coal-boat, sailing from England to the Mediterranean, could carry our wing cases and propellers on deck, taking the engine cases and extras in the hold, there would be sufficient space left for the boat to carry 200

tons of salt. Thus he calculated that the round tour —England–Mediterranean–Norway (West Coast) (even after allowing for the unloading of the coal and the journey to Sicily for the salt), would only leave a reasonable sum to be paid by us for our goods' transport—namely, the difference in freight—to which cost we agreed.

The next move was to examine plans of boats which were "in position" (so far as jargon goes I became a perfect shipping man!) and to find out if the holds were big enough to take our wing cases and propellers, or if they could get protected positions on deck. The crossing of the Bay of Biscay had also to be taken into consideration.

At last there was a suitable boat on the market, namely, the *Vaga*, in charge of Captain Eriksen. The boat was "due Liverpool" at a suitable date, and belonged to the Norwegian-Russian Shipping Company. They took the freight without haggling, and showed extreme willingness to assist us in every respect.

In the middle of January Dietrichson went to Marina di Pisa and made a trial flight with N.24. Omdal went to Pisa after he had spent some time at the Rolls-Royce Factory. Dietrichson returned home in the middle of February, but Omdal remained behind to make a wider study of the machines, and to accompany them and all our belongings, on the *Vaga*, on the voyage to Norway. I myself went down to Marina di Pisa in February, and made a trial flight with N.25. Just before the end of my stay there, Amundsen returned from America and joined me. And thus our lengthy conferences by correspondence came to an end, and matters could at last be arranged by word of mouth.

Following a speedy journey home, word went round that our extensive outfit should be sent at once by the

different suppliers to Tromsö. In the days which followed, cases and crates bearing our address could be seen being transported to us on most of Northern Europe's routes of communication ; goods even came from over the Atlantic, while Oslo, Bergen, and Trondhjem were the critical points. The Storthing consented to supply the means to allow the naval boat *Farm* to be placed at our disposal, and thus, a large quantity of the goods arriving at Oslo, were redirected to Horten, so that we could save the extra carriage. I learned in those days to set great value on the telephone, regarding it as a marvellous institution. Indeed I felt I had not valued it sufficiently highly, for the Oslo exchange appeared to be working day and night. Roald Amundsen, for instance, would ring me before eight o'clock in the morning to give me the day's orders. At that hour Amundsen had already breakfasted and was ready to begin his day, whereas I had hardly finished with the night.

There was not the slightest use in trying to turn round for another little five-minutes' snooze, for immediately after eight Dr. Ræstad would come on with his orders. I was, therefore, very impressed by the earliness of the hour at which the Doctor started his day, but it was not very long before I learned just exactly what attire he was in when he rang ! (The last remark, to use a flying expression, was a " side-slip.")

Back to the spot where I began to glide.

None of our goods were delayed anywhere, not even the tiniest little case. And for this we owe much gratitude to the Railway Goods Managers, the Bergen Steamship Company's Despatch Managers, and the Nordenfeld Steamship Company's Despatch Managers in Trondhjem, and also Einer Sundbye of Oslo, and to Horten's Quay.

In Tromsö our " Goods Manager," Zapffe, collected

everything and stored it. When we checked our lists everything was in order.

We should have taken over the *Hobby* on the 30th of March. At that date it lay at the shipyard without cylinders in the engine, but by Tuesday the engines were in order. When it should proceed, however, to the quayside to begin loading, the engines refused to turn the propeller round. The explanation was, that they had changed the propeller, and got a new one which was too large. The boat went back into dock, and was fitted again with its old propeller. Fortunately the *Vaga* was belated on account of stormy weather. This delay, therefore, did not inconvenience us. As there were no cranes in Tromsö we had to order the *Vaga* to Narvik.

In the course of Wednesday, the 1st of April, the *Hobby* finished loading everything which should go into the hold, and we left at night for Narvik, arriving Thursday evening. On Friday, the 3rd April, the *Vaga* arrived at 6 a.m. The cases were undamaged to our great joy. The *Vaga* had indeed had bad weather on several occasions during the journey, but Captain Eriksen forgot the interests of his owners and steamed slowly on account of our goods.

By Friday afternoon we had all our cases ashore and on the railway to be run along under the cranes, and the loading of the *Hobby* began. The cases with the reserve parts went down into the hold.

The engine cases should also have gone down into the hold, but we found that the measurements I had got were for the outer edge of the hatches, instead of for the actual dimensions of the opening. The cases would not go down, not even when we tried them on the slant. We took the engine gondolas out of the cases, thus dividing them in two ; placed the first part down

in the hold, with the second part stowed on top of it.

On Thursday we had one case stowed away in the large hold, and speedily set about building a foundation for the wing cases, which should lie on top of that hatch. The aft mast stood a foot further forward in one sketch than it did in reality, therefore we could not get sufficient room to lay the wing cases behind each other alongships. This was a bad business. Either we must lay the cases across the decks, where they would stretch out 1½ metres each side, or we must charter an additional ship. I approached a Shipping Company, which had a small boat lying at Narvik, but as they wanted 20,000 kroner to carry one wing case to Spitzbergen, I had no choice left in the matter, but to carry on as well as possible with the *Hobby*.

During Sunday night the whole expedition nearly came to a sudden end. A hurricane of tremendous force suddenly arose. The wing cases and the propellers, alongside the engine cases, stood directly in the wind, on a railway wagon on a branch line near by. The watchman called for help and ran to the rescue, assisted by the despatching staff, and in a short time they managed to get the cases securely fastened to the railway wagon, which, in turn, they secured to the quay. Just as they finished, the wagon which held the engine cases decided to set off on its own account, and tore away, driven by the wind, at the very moment, when the brake was released inadvertently by someone, during the course of operations. Fortunately, in the centre of the quay, it collided with a shed and came to a full-stop by running into a stack of timber.

Had the watchman not called for help immediately undoubtedly some of the cases would have been blown out to sea. The wind got stronger and stronger during

the time that people were busy securing the cases, and they all had to move with the greatest caution to prevent themselves being blown off the quay. The explanation of this strong wind lies, I believe, with the high hills which surround the harbour.

Several ore-boats drifted off in the dock and were damaged. As it continued to blow all Sunday we had to discontinue loading. During Monday we got the second engine case and both wing crates on board. Those which were loaded aft we had managed to place alongships, but we decided to lay the forward ones crosswise on the deck, well forward, where they (on account of the curve in the boat's build) lay higher and out of line of any waves which the boat might ship and which would leave her decks awash.

On Thursday, the 7th, by midday, both propellers were on board, stowed above the wing cases. It was a long, tedious piece of work, but the main point was, that everything went well. The *Hobby*'s deck cargo looked alarmingly high, and when one realized that our course lay amongst the ice it made one apprehensive. For my part, when I thought of what a bill for damages would mean to us—the sacrifice of the expedition for that year —it was little wonder that I trembled. There were plenty of people to utter cautions, but the *Hobby*'s captain (Captain Holm) and the ice pilot Johansen, both said, things would be all right "if only luck went with us."

The top weight was not alarming, but it was an anxious moment all the same, when we saw the deck cargo piled so high. As soon as we got away from the quay and got up a little speed, we put the rudder hard over to see if the boat was specially "tender." The *Hobby* listed over considerably less than I had expected. I trusted we should have only a small swell before we got into Tjellsund, but fortunately we found smooth

water. In view of what we learned later we have great reason to be glad of this, for, had we had an example there of the *Hobby's* rolling abilities, we should certainly never have assailed the ice conditions ahead. We should have been forced to charter the extra ship which I mentioned and would have had 20,000 kroner bigger debt to-day.

We arrived at Tromsö on Wednesday, the 9th, at 9 a.m. It was a great day for us all, and for me especially. Roald Amundsen and the other members of the expedition had arrived. The *Farm* was there as well. For the first time we were all gathered together. I felt so confident when Amundsen took over the direct leadership, and then I went off to do a little business of my own.

During the day Amundsen went through the whole outfit, and everything which had been ordered in Tromsö was placed on board. The entire day was given up to work, and it was late at night when we began to make ready for sea. All questions in connection with transport insurance were attended to with the greatest of skill and of kindness by my friend, Herr R. Wesmann.

In Narvik, during the loading, I had trodden inadvertently on a nail, which had penetrated my right foot. The day in Tromsö, therefore, proved a very hard one, as I suffered extreme pain with every step I took. The worst part of my affliction, however, was that so many people showed their sympathy with me by relating all the dreadful things which had happened to *this* acquaintance or to *that* one, who had had a similar accident, and they threatened me with blood-poisoning or something equally unpleasant. Blood-poisoning would have rendered me useless for flying, and I swore to myself that I would go right round the old boat many times in future, without trying to take a near cut in

rubber-soled shoes along a plank or something similar, running the risk of treading on another nail.

A newspaper suddenly made the discovery that Thursday was the expedition's lucky day, as we started from Spitzbergen on a Thursday, and came back with the *Sjöliv* on a Thursday! I can supplement these facts by adding that some of us travelled home on a Thursday and the expedition left Tromsö on a Thursday, which was also a day full of fateful happenings during the entire course of the expedition.

On the morning of Thursday in Easter week, at five o'clock, we left Tromsö with the *Farm* just ahead of us. On board the *Hobby* we were busy fastening the last lashings to the deck cargo, until 7 a.m., after which I got to bed. At 9.30 I was awakened suddenly by someone shouting "*Farm* is signalling." Expecting something of the kind to happen I had gone to bed fully dressed, and was therefore prepared to rush on deck almost before my eyes were opened. A man on board the *Farm* was semaphoring. . . . I signalled that I was ready, and the communications started. I had just received the words "We are going to . . ." when the *Farm's* rudder was put hard over, and the rest of the sentence was lost by the aftermast swinging round in my line of vision, cutting off the signaller and his message from view. He missed my "repeat" signal, probably because I had not taken my flag with me in the hurry, and was only replying with my arms. He must apparently have seen something which he took for confirmation that his signals had been understood, for he hopped away seemingly quite satisfied and the *Farm* continued on her way. If the *Hobby* had had her steam whistle in readiness I would at once have blown the "repeat" blast, but it would have been necessary to have got in touch with the engine-room first, in order to get air into the whistle. I gave it up, there-

fore, and came to the conclusion that the *Farm* had no more serious intentions than merely to manœuvre. I had heard something about a good landmark on the other side of the fairway, and thought thus that they were making a deviation from the usual course. Knowing that the *Farm*, with her greater speed, could soon overhaul us again, we continued straight on, to prevent delay. The *Farm* in the meantime hurried across the fjord and, as it turned westwards out of its course, I knew it had some special move in view. We turned as quickly as possible, following behind with all possible speed, but it was too late, and the *Farm* disappeared in the distance. We believed it would appear again westward of Fugleö and stood by in the hope of meeting it.

We had not been long in the open sea before we met heavy weather. How the *Hobby* rolled! The wing-cases, which lay across the decks, were dipped in the water at each side. I carefully surveyed the various lashings, to see that none were working loose, as the boat tossed and rolled. It was midday and a heavy sea was striking us abeam. Soon I noticed that the securing-ropes of the forward case had slackened, and it was sliding a couple of feet backwards and forwards as the *Hobby* continued rolling. We "hove to," therefore, until we managed to fix the cases with new lashings.

The situation was unpleasant. The *Farm* was not to be seen, and it had the meteorologists on board and would thus get weather reports. I would have given anything I possessed to have learned whether the weather would get better or worse. I gravely considered the advisability of turning back, but this proceeding would have meant giving up the idea of the *Hobby* carrying everything to Spitzbergen, as the ice-pilot's only hope was that we could find better weather to get through the ice at this time of year with our high deck cargo. Much

valuable time would be lost if we had to go in search of an auxiliary ship, and then to get some of the heavy cases discharged from the *Hobby* and reloaded on the new boat. On the other hand, the welfare of the whole expedition was at stake, and my thoughts turned to Amundsen. Had the cases only contained ordinary goods, the sea could gladly have had them, but they contained our flying-machines! When we "hove to" to secure the lashings, I noticed how much steadier the *Hobby* lay on the waves, and decided that we could perform the same tactics again at any moment if things got too bad. The Meteorological Institute had promised us good weather, so we decided to continue in the present position for a little while even after the cases were secured, until we should see if conditions were likely to improve. Another thought came to me when things were at their worst. Just before leaving Oslo I had been called before the Admiralty, and it was pointed out to me that they had doubts about sending the *Farm* amongst the ice at that time of year—not on account of the vessel itself, but on account of the crew. I replied that the *Farm* and the *Hobby* should always remain together, so that the *Hobby* would always be at hand to render any necessary assistance. Simultaneously we got a message from the *Hobby's* brokers to say they were very doubtful whether the Board of Trade would permit the *Hobby* to leave with a deck cargo—not on account of the vessel, but on account of the crew. I calmed them down by assuring them that the *Farm* and *Hobby* should remain together, so that the *Farm* could go to the *Hobby's* assistance if necessary. Tragic as the situation was I could not help smiling, for both vessels, instead of being able to help each other, had enough to do to look after themselves.

It seemed to me in one respect that it was a good

thing the *Farm* was out of our immediate neighbourhood, as it would have been dreadful for Amundsen to see how frightfully we rolled from side to side, without being himself on board with us, to know that in all the "happenings" we remained masters of the situation.

Between Thursday night and Friday morning the weather improved, the wind had lowered, but there still remained a heavy swell on the water. If the *Hobby* got a little off the right course now and again, she was steered round with a tremendous pull which brought me flying on deck to see how things were going. Thus there was little sleep the whole night, certainly never more than an hour at a time.

On Thursday morning we passed Björneöen to the westward without seeing the island, as we had now thick fog. Here we passed the first ice, which was typical pancake ice.

During the day a south-easterly wind got up and increased later to a stiff breeze. So long as the sea was moderately calm, we did not mind, as the wind was blowing direct aft, and we were making good speed. By midday the sea had got so rough, and the wind so strong, that we were faced by the same dilemma which has faced many a seaman before us. How long could we carry on without having to "heave to?" We altered our course a little, in order to get as quickly into the ice as possible, by way of Sydkap. We knew that if we could only get along in that direction, we should be sure to find smooth water, so we continued on that course and made fair progress. If the sea should get too rough, so that we could no longer keep going, it might be too late to "heave to," for during that manœuvre we might steer into the wind, getting the heavy seas abeam, and there was every possibility of our losing our deck cargo.

If, therefore, we were going to steer into the wind, it would be advisable to do it in good time.

Occasionally the *Hobby* rocked heavily when a heavy sea caught it astern. We rolled violently, not nicely and comfortably, but with heavy, violent heaves, so that the lashings cut into the planks, which lay between them and the corners of the cases. During one of these heaves the man at the wheel was thrown across the wheel against the rail, at the lee side of the bridge. He hurt himself pretty badly, and was unable to work for some time. The mate's comforting remark was that conditions might be much worse when we got nearer to the banks. I was more afraid than I have ever been before in my life, and I hope sincerely that I shall never get into a similar position again. It was not my life I feared losing, for there was meantime no danger of this. It was the deck cargo's fate about which I was concerned, namely, the flying-machines. If the cases had been filled with gold they would have been heartily welcome to go overboard, but we must at all costs keep the flying-machines safe and sound. The expedition must not be put off this year. I felt thankful again in my heart that the ships had got separated, for the *Farm* could have given us no help. They could only have stood as helpless spectators on board that vessel.

During the evening of Easter Saturday, the wind stopped increasing, and in the course of the night died down somewhat. On Easter Sunday evening we got into the ice and calculated that we were almost in a direct line with Spitzbergen. Under ordinary circumstances the proper thing to do would have been to steer north-west into free water, until we were level with King's Bay. Meantime there still was a considerable swell, which now came from the south-west. The fog still surrounded us, coming thicker from the south-west. But the ice meant

On the Derricks

smooth water for us and safety for the deck cargo. We were, therefore, in no doubt what to do. Hoping that we might be able to keep on a clear water-course we proceeded through the ice towards the land. Little by little, as we got further in, the swell decreased, and at last almost calmed down. How heartily I blessed that ice. At eleven o'clock we could not risk going any further, as we could no longer see anything ahead. The *Hobby* was brought into some compact ice, and we "laid to" for the night.

Even if we should still encounter difficulties, in finding our way to King's Bay, and if the fog should not lift, at least we were now safe for some hours, so I went to my bunk and slept like a log as soon as my head touched the pillow. 6 a.m. we were under way again. The fog was still as thick as ever. During the trip we had not taken any observation, apart from the "noon observation" on the day before Easter. But even this was uncertain, as the horizon was hardly visible on account of haze. We therefore did not care to go nearer to the land, but steered along it, as well as the clearings in the ice permitted. Our course, therefore, varied between north-east and north-west. When we thought we were abreast of King's Bay, we steered right in towards the land and got ready to "cast the lead." We could now see far enough ahead to stop in good time when necessary. Then, it seemed suddenly, as if a curtain had been raised right abreast of us to starboard, and in pale clear sunshine we could see the northerly point of Prince Charles Foreland. Holm and Johansen, can with good reason, be proud of their calculations and navigating. We had kept the right course, steamed full speed, and now we sailed right out into the radiant sunshine. Behind us lay the fog like a high grey wall. It was "död dam stille" as we say, and ahead lay King's Bay.

How glad we were. We just looked at each other and smiled as we heaved deep sighs of relief. What a wonderful sensation! We were there! Nothing could now impede the progress of the expedition. How annoyed all the sceptics would be. They would have no reason now to walk through the streets and shout: "I was right. I told you so!" There was a strong feeling of thankfulness, mingled with our satisfaction, that we had been able to get through all right, and bring happiness to Amundsen.

We were not long in getting shaved, and letting our faces make the acquaintance of fresh water again. Then we went up on deck to see whether the *Farm* had arrived. The burning question during the trip had of course been: "Where can the *Farm* be?" We had also laid wagers and held various opinions about this, but I believe we forgot these in our joy.

Yes, there she was, right up against the ice-edge. The *Hobby* had still to force her way through an ice-belt, which was fairly clear, but yet progress seemed to be terribly slow. We were overcome by our own feelings, which seemed to shout the words, "Here we are and everything is all right!" At last we were through, and right up to the edge of the ice. We noticed that things got lively on the *Farm*. I went forward on to the deck cargo, and waved my cap to show that everything was all right. My challenge brought instant response. Ringing cheers reached us. Naval flags were dipped confirming our supposition that they had been anxious about us. When the *Hobby* put its nose into the ice-edge we were all on the forecastle. Amundsen came towards us with a broad smile on his face. We knew and understood how pleased he was, and all our anxiety and the terrible strain on our nervous system were soon forgotten.

In King's Bay

The remainder of my report will merely be an illustrated book accompanied by a little text in order to avoid what Amundsen has already written in his account.

It was a disappointment that the ice stretched so far out. On the ships' arrival, it was so thick that none of them could break it. The next day, however, on account of the mild weather, the ice got so brittle that the *Knut Skaaluren* (although with difficulty) managed to break up a channel for us all. As the *Skaaluren* had a good deal of cargo to discharge the *Hobby* could not get to the quay for several days. It was a disappointment, but turned out to be a piece of good luck. I had thought about rigging up some booms (which we had on board) to the crane on the upper deck, in order to discharge our large cases on to the quay. We had no time to wait until the *Skaaluren* was finished, so we had to take our chance with the *Hobby's* own derricks and winches. The last were not specially suitable for lifting heavy pieces. They were electrical ones and could go full speed one way or the other. This would mean stopping with a nasty wrench. In order to reduce this, we rigged up some tackle, instead of leaving the single wire.

When I said that the disappointment turned out to be a piece of good fortune, I mean, that on account of these circumstances, we saved a lot of time by using the *Hobby's* own gear, and discharging right on to the ice without loss of time.

In order to reduce the weight of the bodies of the machines, we first of all took off the packing.

As the forward derrick could not swing the boats' bodies clear of the wing cases, which stretched over the

railings, we had to take both boats' bodies in the after derrick. N.25, which stood aft, was lifted first and swung out. It came nicely down on to the ice and N.24 followed.

The aft case with the wings was then turned so that it lay right across the railings. Both cases were put on end, so that we could get at the hatches. The motor gondolas were then lifted up and put into their places.

In the meantime, the *Farm's* boys hacked a glide from the fjord ice to the land, and the boats' bodies were pulled along and taken straight to the place which had been chosen for the mounting of them.

Our assistance for the mounting of them could not have been better. On the one side a mechanical workshop and on the other, a smithy, and a big room which was put at our disposal. Here we had benches with vices, etc.

For getting the wings ashore we had to get to the quay under all circumstances, but there was no hurry now, as we had plenty to do in getting the motors ready.

It was not just the most comfortable temperature to work in. Now and again one could see war-dances being performed round the warming-pan.

In the meantime, the *Farm's* boys cut the ice up round about the quay, and kept the water channels open, so that the ships could change places more easily.

Just when we had finished our work with the motors, the *Skaaluren* left the quay and the *Hobby* came into her place. The wing-cases were just lying at the same height as the quay, so that, everything considered, it was easy work to get them ashore. Luckily we had no wind that day, so conditions permitted us to carry the cases on end, which was necessary on account of the space there.

Under the guidance of Schulte-Frohlinde we started immediately to mount N.24, and soon it began to look more like a flying-machine.

The Assembly Shop.

Fixing the Propeller.

When taking N.24's wings ashore, we had a good deal of wind. It was, therefore, not easy to get them ashore on end. After landing them we had to carry them in a horizontal position.

We could not wait for calm weather, as the meteorologists predicted a long period of fresh breezes. The bringing ashore of the machines was carried through without the slightest damage to the material, nor had any damage taken place during the long transport from Marina di Pisa to King's Bay. All of us, therefore, had good reason to feel pleased that day.

Whilst Schulte-Frohlinde, Feucht and Zinsmayer completed the mounting, Green and Omdal continued their work with the motor and completed it by putting on the propellers.

After everything had been tried and tested and proved to be in splendid order, there arose the burning question, which had been in my mind for the last half year, namely, how would the machines run on the snow? Just exactly in front of the mounting place, were any amount of suitable spots where we could make a trial on level snow, so I made the first test on May 9th. The boat, as was only natural, stuck fast at first, but got free quite easily with a strong pull. It was a delightful sensation to realize how easily it glided along. Had it sunk heavily down into the snow and stuck there, matters would have looked less bright for us.

Flying-boats of this size had never been tried on snow before, but we built on our own belief in its being possible; had it not been so we should have been in an unpleasant position.

From the day we gathered all our material together, our programme went according to date, and in the beginning of May, we were all in readiness, to set off in the second half of the month, if conditions permitted.

That day was for me, therefore, a *great* day in the expedition's course, and everyone will understand my feeling of joy, when after testing the machine, I was able to announce to Amundsen : " We are clear to start, the moment our leader says the word ! "

PART III

DIETRICHSON'S EXPERIENCES

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DIETRICHSON'S EXPERIENCES

Report about N.24 from the start until we joined N.25 and its crew on the 26th May

I AM sitting in the South in real, tropical, summer heat. Outside my windows, roses of all colours are blooming, and the air is positively saturated with the perfume of flowers. Beyond the harbour, as far as the eye can see, the water is like a mirror, clear and inviting.

I have to write a few words regarding our experience on the Polar Flight. The events seem so far, so far away, that it all appears almost as a dream. The *present* is a reality. It reminds me of the days when, up in the ice-desert, we had a similar if not quite so strong a feeling, that the glorious days, which we had spent with Director Knutsen in King's Bay, were mere fantasies.

Meantime, my diary with its few daily notes lies before me, and with the help of these, I hope I can manage to give a correct description of the events which I am trying to depict. I may add that I am principally concerned in giving a correct narration of the actual happenings, and nothing is further from my thoughts than literary ambition.

I will start by quoting my notes of the 21st May: "Easterly breeze, clear weather, excellent conditions for starting. Hope that the great day has now come. Try to start with 3,100 kilo. weight, but am prepared to have to reduce same."

This was written on the morning of the 21st, and my hope was to be realized. Meteorologists predicted good weather conditions in the Polar Basin and the plane was loaded and ready. In the afternoon the members of the expedition, accompanied by friends and the people of King's Bay, went out to the plane. The lashings received final touches, instruments were placed in position, and engines were started. In the half hour during which the engines warmed up, we said good-bye to friends and acquaintances, and we placed special value on the good wish " God bless your trip " which we received from the miners' representatives and the crew of the *Farm*. Our tireless friend, Director Knutsen, showed his kindness by giving us practical proof of it, by handing us, when we were on board, a parcel of sandwiches, cold meat and hard-boiled eggs, as well as a box of excellent oatcakes, baked by Fru Director Clausen of Aalesund. As transpired later, these provisions came in exceedingly handy.

At last both planes were ready. Omdal reported that the engines were all right, and Ellsworth was ready with his navigating and meteorological instruments. N.25 was lying with its nose facing the fjord, where the start was to be made. N.24, somewhat further in, lay parallel with the beach, in order to escape the air pressure and the snow spray from N.25's propeller. The latter plane at last slid down the hacked-out glide on to the ice, and N.24 proceeded in a half circle in order to follow down the same track. Meantime, it was no easy task to raise the heavily laden plane 90°. At the same time as the engines pulled the plane slowly forward, something snapped through the pressure on the tail. But there were plenty of willing hands—too many, in fact. Above the humming of the engine I suddenly heard a noise which sounded to me as if a row of rivets in the bottom had sprung. Meantime the plane was in starting position.

Dietrichson Before, During and After the Flight.

Final Arrangements.

The people were quickly waved aside, and we glided down on the ice in the track of N.25. Director Schulte-Frohlinde, from the Pisa Works, had undoubtedly heard a suspicious noise when the rivets burst (that could be seen by the concerned look on his face), although the noise probably sounded worse in the plane, than outside. I presume he calmed down when we continued on our way, but I smiled to myself at the sight of his sudden shock. As far as I was concerned, the occurrence was quite clear. I knew that some of the rivets were out, although I could not judge how many. But I took it for granted that it would not place any special difficulties in the way of our landing or starting, even on the water, after we had lightened the plane by over 1,000 kg. of petrol and oil on the way up to the Pole. Added to this was the chance that we might possibly land and start from the ice, where the leakage would not matter. On the other hand, repairs would have delayed the start indefinitely ; then again we might have periods when, impatiently waiting to start, every minute of the day we would look concernedly at the weather conditions becoming foggier and foggier and delaying us. My all-engrossing thought was : " Now or never." And thus we carried on.

The arrangement was that N.25 should start first. There was a slight breeze from the end of the fjord, but in order to prevent a turning of 180° with the heavy-laden plane, we decided to try first to make a start beyond the fjord. We therefore stopped in the middle of the ice and started to put our flying suits on, which we did not need to don until the last minute, in order not to get too warm before starting. Suddenly we saw N.25 gliding landwards and flying past us with both engines working at full power with constantly increasing speed. It was clear immediately that the start would be successful.

I did not get time to see more, nor to put on snow-glasses and gloves, for the ice began to sink more and more under the plane's weight. There was already a foot of water on the ice round about us, and at the same time Omdal informed us that the water was also rising inside fairly rapidly. These conditions coming all at once made it imperative to act, and a few seconds later I had given N.24's 720-horse power full scope. It looked as if the plane spent a little time in consideration, but then it started slowly to glide ahead, the water on the ice disappeared, and quicker and quicker we drove over the lightly snow-covered ice-plain. It seemed as if the high glacier at the end of the fjord was coming to meet us at a dangerous speed. But a glance at the speed-ometer showed a steady, regularly increasing speed which had a completely calming effect. As the indicator showed 110 kilometres per hour I thought that the plane could rise, but in order to make quite certain, I waited until the indicator showed 120 kilometres before I let it rise slowly.

It was an inspiring feeling to be in the air at last. The fascinating expedition had at last begun. The time of preparation was over.

Our admiration for the plane's ability knew no bounds. As mentioned before, we were quite prepared to face the necessity of having to jettison a part of the load, namely, petrol. According to the contract, the plane was only bound to carry 2,500 kilos. weight, but we got away all right with 3,100 kilos. As we learned later, the starting track was 1,400 metres long, but if necessity had demanded it could have been considerably shorter.

As soon as the nose of N.24 had been slowly and carefully steered round outside the fjord, I started to look out for N.25. It is surprising how difficult it often

is to discover a plane in the air from another one. But at last I saw it, and apparently on board N.25 they were also on the look-out for us. All the circumstances which could possibly arise, had been thoroughly discussed before starting, and the main thing was, if possible, to keep together. Written orders were, therefore, not necessary, and only one written order was issued, as a guide, in case we should be separated, and same read as follows : "In case the two planes and their crews should lose contact with one another, N.24 and its crew shall continue operations under Lieutenant Dietrichson's leadership as agreed. Lieutenant Dietrichson has the right in the name of His Majesty the King of Norway to take possession of any land that may be discovered."

As we then glided northwards along the west coast of Spitzbergen past the seven glaciers and further past Danskoen and Amsterdamoen, it was certainly our mutual wish that luck would favour us, so that we should never lose sight of one another. This wish was strengthened when early in the course of the flight thick clouds and fog met us, forcing us to rise to about 1,000 metres, where we found the sky beautiful, blue and sunny, whilst the fog lay below us like a blanket stretching out northwards as far as the eye could see.

The arrangement was that the flight up to the north coast should be considered as a trial flight, and that both planes should return to King's Bay if everything was not going on all right ; but if the contrary was the case, to continue. With a feeling of relief I saw that N.25 continued its course northwards, so that everything on board there must be in order. But shortly afterwards I noticed by the cooling-gauge that the temperature of the water had risen alarmingly. Omdal, always practical, had been prudent enough to fix a bell from my compartment to the petrol-store and to the engine-

gondolas, and as soon as I had pressed the button Omdal was beside me. I pointed to the thermometer, which was steadily rising, and Omdal disappeared aft again like a rocket. He is a phenomenon in wriggling round the engines, where (to use a mild phrase) space is scarce. I glanced aft and saw that the radiator blinds were not quite open, but even after they had been opened wide, the temperature continued to rise. The indicator had passed 100°, and I felt sure that we would have to make a forced landing. Through small holes in the fog we could see the drift ice below us where a landing would certainly mean a wrecked plane. The temperature rose higher and the last I saw was, that it indicated 115°, when the thermometer burst, and my hopes sank to zero. I rang again for Omdal, but a little time elapsed before he came, and I judged that he was busy. Meantime I was astonished to see that the engines still went as well as ever. I had throttled them down to 1,600 revolutions, but expected to hear a crack any minute; and how goes it with the forward motor ?

The two engines had a common radiator, but the thermometer showed the temperature of the water after it passed the aft-motor, so there was still a hope for the forward one. The radiator gauge for this motor was, however, fixed in the engine gondolas, out of the pilot's control. After what in my anxiety seemed to be several minutes, Omdal appeared again, and when I asked him what was the matter replied that everything was all right. I knew anyway that the expression " all right " was (to say the least of it) an exaggeration, in view of the fact that I had seen the temperature rise to over 115°. But at the same time I knew that the engines worked with a regular hum, and if anybody could manage to keep them going, it was Omdal. I therefore hoped to keep in the air by very careful flying. As minute after

minute passed, without catastrophe, my confidence rose.

Side by side, these two gigantic birds flew northwards toward the unknown, cold, inhospitable polar regions which for centuries have been the scene of so many men's cravings and strugglings, where so many defeats have been borne after unbearable sufferings, privations and vain endeavours, and where also a few mighty victories have been won.

One could not avoid thinking about the difference between our present journey and the previous expedition. Roald Amundsen thought of the new element —the air as the connecting link—making use of it for the first time in polar exploration (if one excludes the intrepid Swedish explorer Andre's trial with his balloon in 1897, the result of which has been lost to the world's records). Would the world gather new knowledge from our experiences ? How far it would benefit depended, in my opinion, on the landing possibilities. If we should be lucky in finding suitable landing-places, at not too lengthy distances apart, our undertaking would certainly succeed. If the opposite should be the case, the chances would, of course, be small. But just the question of landing-places gave an element of uncertainty to our expedition. The presumptuous " specialists " gave distinctly opposite opinions regarding the conditions of the water-lanes of the ice regions. All these opinions showed one common result, namely, that we could not depend upon any of them. Nobody had so far observed the conditions from a flying-man's point of view. This we were quite clear about, but we depended upon the material at our disposal, namely, our flying-boats, which, if the worst should happen, ought to be able to take us back home without our making a landing.

I believe we all sat there thinking how previous

expeditions had advanced laboriously, kilometre after kilometre; had climbed over high icebergs and passed water-lanes during exciting marches which lasted days —waterways which blocked the way, making it necessary to cross them with the aid of the frail equipment which the explorers could carry with them. In contrast to this we were now, three men in each plane, who steered, with slight touches and very little work, these flying-boats, which not only carried us but also our equipment high over all the obstacles, with a speed of some kilometres per minute. Frithjof Nansen mentions several times in his reports about his and Johansen's journey towards the North Pole, that he wished he had wings in order to pass the countless icebergs. The dream has become true. As long as we can remain in the air the icebergs cannot hinder us.

But to return to the business of our flight. The fog extended further north than we expected, and although this did not interfere with our flying, it interfered with the deviation and speed observations—a matter which was very annoying.

Mr. Ellsworth told me later that he had been very impressed by the flight over the fog-belt. Wherever our plane threw a shadow on the fog-belt below, a double halo in all the colours of the rainbow appeared, and in the midst of this the silhouette of N.24 could be seen quite clearly. This phenomenon accompanied us all the time we were over the fog-belt and was very impressive. Roald Amundsen had observed the same thing in connection with the flight of N.25.

Just after we had passed 82° north the fog disappeared and we continued to fly over these boundless icefields, which stretched monotonously as far as the eye could see. We flew at different heights varying from 1,000 to 3,000 metres.

In the Water Lane,

The ice looked quite different to what I expected. Instead of the big kilometre-long ice plain, we saw ice plains which through cracks or bergs had been divided into small, irregular pieces, where it was impossible to land. And open water-lanes ? These were reduced to quite small snakelike cracks, following a winding course, on which it was also impossible to land. As far as I was concerned, I consoled myself with the belief that probably once we came nearer our goal, we should find the ice plains a little larger and evener. But hour after hour passed without the conditions below us changing to any noticeable degree. Notwithstanding this, and in spite of the fact that our second engine had been exposed to extraordinary strain, I still felt quite safe. The regular beat of our two Rolls-Royce engines, which never varied in the very slightest, and which might well be considered the height of perfection in British workmanship and exactitude, gave one confidence. And it was a necessary factor. Every flying-man will understand this.

One question which always cropped up whenever the North Pole flight was discussed, was in regard to the cold, which one thought would be found unbearable by the crew. Let me say at once that it did not bother us in the least. Even in the case of the pilot, who is so closely tied to his place, it proved to be of no great discomfort. This, of course, was on account of the carefulness with which we selected our kit, thanks to the long experience of our leader in the polar regions. I was rather afraid about my hands and feet, but the clothes which are described in another part stood the test splendidly.

Meantime, one hour passed after another, and we had soon made a flight of eight hours' duration. Reckoning on a speed of 140 kilometres per hour, that ought to

have brought us directly into the neighbourhood of the Pole. Our position now depended solely on how strong the wind had been blowing against us, or, in other words, what ground speed we had made. But what was to be done? Landing-places were still not to be found. Omdal came forward to me and shook his head for once, pointing to the icefields below us. Then we suddenly saw—for the first time since we went above the fog-belts at Spitzbergen—the sun playing on to blue water, which was rippling under the influence of a slight breeze. We could hardly believe our eyes. N.25 changed its course down towards the tempting water and started slowly to descend. We followed. The water-lane was apparently large enough to land on, but was divided into several portions by icebergs and banks of snow and ice. It was hopeless to land on the ice round about, and it presented an increasingly worse appearance the lower we got. I saw N.25 land in an arm, or, speaking correctly, in a branch of the waterway, where, as far as I could see, there was very little room. I came to the conclusion, in any case, that there was only room for one plane, and therefore I flew round a little, and landed on an ideal place a little to the south, in a fine little lake. With slow speed we proceeded on to the biggest ice-floe we could see, and secured N.24 there. I noticed that the aft motor stopped of its own accord as soon as I had throttled it down.

The first surprise we met with, as soon as we arrived on the ice, was a big seal, which, inquisitive as usual, put its head out and looked inquiringly over us. I am not sure who was more surprised, we or it. Never had we heard about animal existence so far north, and the seal had certainly never seen a flying machine before, either there or further south.

We, of course, went ashore immediately, in order to

look for N.25 and its crew. I had taken note of the direction of their landing-place, and thought we would be about three-quarters of a mile away from them. The sight that met us when we climbed the highest ice-clump was just as depressing as it was surprising. No sign of N.25. As far as the eye could see there was nothing but ice, and ice again, on all sides, except in the direction of the water-lane from whence we had come. And *what* ice! Not large—not even small—plains of ice, but hills of it, and long high icebanks which impeded the view on all sides. We had seen from above quite plainly that landing-places on the ice were very poor, but what we saw now affected us overwhelmingly and surprisingly. We shuddered involuntarily, and yet at the same time we were gripped by a sense of the wildness and of its beauty. But we must get to work. We must find N.25, so out came the glasses. After having eagerly looked for a little while, we discovered the end of a propeller and a wing sticking out over an iceberg. We estimated the distance to be three-quarters to one mile, and decided to walk across to that spot as soon as we had eaten a little. Personally I had not tasted anything (wet or dry) and had not missed it. But now I had developed an appetite and Director Knutsen's sandwiches were more than welcome. Omdal immediately got busy with his beloved engines, Ellsworth sacrificed himself to the studying of the meteorological conditions, while I quickly "took the sun," which showed that we were about 87° 50′ North.

It appeared to us that the plane lay safe and sound, and Ellsworth and I decided to walk across to N.25. We expected that by walking along by the water-lane we would be able to cover the distance in 1½ hours, and for safety's sake took the canvas boat along with us. We did not bother about provisions or anything else.

Before we started we hoisted our brave Norwegian flag on the top of the iceberg.

Ellsworth and I set out most confidently, but reaped our first bitter experience of marching on the polar ice. It *looked* difficult to get along, but it proved to be still more so. We climbed up and down icebergs, carrying our canvas boat, of which we had to take the utmost care, so that no sharp piece of ice should tear a hole in it. Soon we had to use the boat as a bridge, in order to cross a small crack filled up with broken ice and mush—or as an aid to fighting our way through thin new ice in somewhat broader ditches. At last we got full use of the boat in a broad water-lane, where we paddled along a good distance. Now and again we got a sight of N.25 above the icebergs as we approached. Suddenly we saw the propeller moving. We were therefore certain that the crew and also the plane were "all right," and as the new ice was completely blocking our course, we decided to return to N.24. With the same toil (and after we had tumbled into the water several times) we returned tired and fagged out.

Omdal awaited us with steaming chocolate and it tasted excellent. Whilst we had been away he had discovered that several exhaust pipes of the aft engine had become clogged, so they had to be exchanged by spares. He expected that the work would take two to three days. Meantime the ice started to close in round the plane, which we therefore decided to turn round, so that the nose pointed out of the water-lane, and thus, if necessary, we could leave by only using the "fore" engine.

It was easier said than done, because, first of all, the ice had to be broken round about the flying-machine, and more than once we got thoroughly drenched. But after three hours' work the plane was in the desired

Ellsworth, the American Member of the Expedition.

position. The question now was, whether the crew of N.25 had seen us. We presumed they had seen our flag, but of course this was not certain. If everything was in good order, they would start off to join us as soon as they had been able to take careful observations. Anyway we were sure that they would see us when they started out, and so we climbed a little higher than we already were. We had nothing else to do but to put our engines in order as quickly as possible, to be ready at the earliest moment. We therefore put our tent up "*on the land*" of the ice-plain, and took the necessary mess requisites and sleeping-bags with us. In addition we also armed ourselves with a gun and revolver, in case we should be surprised by a polar bear. A seal we had already seen, and a bear might also be lurking about. Omdal was to work solely on the motor, helped, if necessary, by Ellsworth and myself, whilst we had to do the cooking, take observations, keep a look-out, and now and again pump the boat free of water. The leakage proved to be less than I expected, but still large enough to make us prefer to stick to our tent. This was quite small and light, made of thin aeroplane cloth. The bottom was of the same material. It was quite snug and warm when the Primus stove was lit, but when the snow underneath started to melt, on account of the heat in the tent, it got damp on the floor. We were, of course, entirely cut off from wood or leaves or branches of trees.

At midday—still on the 22nd—the sky got overcast and we could no longer see N.25. With our lack of experience in the ice regions, Ellsworth and I had the impression that we were quite safe where we were. Omdal, who *had* some experience from his sojourn in Alaska, was not quite so calm about it, but thought that the new ice where we lay would in any case act as a protection against possible drift ice.

In the afternoon the weather cleared again for about an hour, and it seemed to us that we could see the top of N.25 again. Later the sky was overcast with threatening snow squalls. It was clear that the ice was constantly on the move. Meantime the water-lane was so broad that we were not afraid of it closing in. What concerned us most, was the uncertainty about N.25 and its crew. We reasoned out and imagined every possible theory. If everything was all right, they would, of course, fly down to join us in this place, where they could land without difficulty. If the machine had been hopelessly damaged, they would come on foot over the ice to us. We ruminated thus, because it seemed to us that they *must* have seen our flag, and, as meantime we saw nothing of them, we presumed that they had some necessary repairs to effect.

The whole night, until the morning of the 23rd May, we had snow—with bad visibility. Omdal worked at the motors whilst Ellsworth and I pumped. The leakage appeared to be getting gradually worse. We had a northerly breeze and a temperature of about −10° C.

At midday the weather cleared and the sun shone out from a clear sky. In the course of the day I was able to make two good observations, although the spirit level which Ellsworth had brought with him was too small, and besides was of a very unsuitable construction. I had already pointed this out at Spitzbergen, but there was no opportunity of getting a new one. I must admit that I was disappointed with the result of our observations. I had believed that we were considerably nearer the Pole. The others thought the same. Judging by the flying and our speed through the air, we must have had a very strong wind current against us. At that time, however, we did not doubt that we could continue northwards, as soon as the motors were in working order again.

At midday we saw N.25 again. It had drifted nearer to us, and we noticed that tarpaulins had been put over the motor-gondolas, and that the flag was flying over it. If only the weather would remain clear now, they ought to be able to see us. We tried several times to attract their attention by using smoke-bombs, and now and again we fired a gun.

The part of the water-lane where we were encamped froze up more and more, a condition which rather pleased us, as we expected that we would soon be able to make a start from the ice.

In the afternoon we at last noticed that N.25 must have observed us, because we noticed a flag being waved backwards and forwards. This was the customary sign used in the Navy for starting flag-signalling. I was not slow in taking up the challenge, and soon a connection was established. The distance was so long that we had to use glasses, and as these had to be dried continuously the signalling took some time. At last we got the following message: "We are frozen in 20 metres from the water-lane—working in order to get free. If your position hopeless come to us, bring food, axes, deflection instruments, engine O.K." We replied: "Expect we can start on the ice from here, but are leaking badly, therefore longer sojourn on the water impossible."

I think few can imagine what relief it was to us, to have established signal-communication with each other. I immediately gave a grateful thought to Riiser-Larsen and to my naval education.

The whole night, until the morning of the 24th May, we had a fresh breeze with drifting snow, the temperature being $-11°$ C. to $-12°$ C. It was bitterly cold in the tent and the wind was blowing right through it. The sleeping-bags were very excellent, but really only meant

for summer use. We had the "Thermix" heating apparatus with us. It was really extraordinarily good, but, as we had hardly any petrol to spare, we did without the comfort of a heated tent. On our flight northwards, we had been exceedingly economical regarding the consumption of petrol, and we therefore still had half a drum more than half our original quantity. But one could not tell how much might be required for our return journey.

In the course of the day (24th May) the whole fjord was frozen over. The leakage in the boat got continually worse, and thus we were quite pleased to see the ice freezing round our machine, as it would form a resting-place for the wings, and would prevent the machine sinking further, even if we should stop pumping-work, which took up much time, and prevented us from performing other necessary tasks.

During the course of the afternoon Omdal finished changing the exhaust ventilators, and we thought that the motors were now all ready. The fact that they would not start in the severe cold, and especially in the strong wind which hindered the warming of the motors, did not concern us greatly. Spring was on the way, and the temperature would soon rise.

The movements of the ice, however, disturbed us very much. We had the feeling that the icebergs on the other side of the water-lane had got somewhat nearer, and the whole "landscape" seemed to change from time to time. In order to be on the safe side, we decided to put all our provisions and outfit ashore. We started this immediately, and in the course of the forenoon, everything was on the ice-plain near the tent.

Gradually the ice began to encroach more and more. To our joy we noticed that the two machines got nearer together, and we decided to try and get into communica-

Omdal

tion with N.25. We were anxious to find out their position, in order to discuss things with our leader, the only one with experience of drift ice, and the only one who could judge the situation.

On account of the uncertain conditions we did not want to leave more of our equipment behind than was absolutely necessary ; we tried first of all to put our canvas boat (loaded with provisions, etc.) on the ski-sledge. This was the course we should have to adopt if for one reason or another we had to march southwards. After a few hundred metres of toil, fighting our way amongst the icebergs, we realized that it would be quite impossible to get along in a reasonable time, handicapped by this outfit, so we therefore took only the most necessary things in our knapsacks. All the same it amounted to 40 kg. each, and with this on our backs, we started off on our skis. We toiled forward over high icebergs and ice-clumps, and crossed the most fantastic and uneven territory, where skis of course could not be used. Therefore we carried them again, and jumped over the water-lanes or crossed the new ice, which moved under our weight. This was very exciting and tiring, and I admired the progress made by Ellsworth, who is not a ski-ing man. (In addition to his many excellent qualities he is also a true sportsman.) Omdal's Alaskan experiences also came in handy. He was very smart in finding the easiest and safest passages, and we progressed without accident. N.25 was getting nearer and nearer with every minute's march. After we had travelled about half the distance, a long water-lane covered with very thin new ice stopped our progress. It was right across our path, about a quarter of a mile broad, and reached as far as the eye could see. On the other side lay N.25. We were so near that Riiser-Larsen and I could signal to each other, without difficulty, and

without using glasses. We received word that they considered it impossible for us to get across, and we had nothing else to do but to get back the way we had come. Before leaving we arranged that we should signal to each other the next day at 10 o'clock Greenwich mean time.

After seven hours' toil we were back again at N.24. It was lying just as we had left it and all three of us went to "bed." It was bitterly cold, but we got the first decent sleep since we had left Spitzbergen. We had gradually got more accustomed to the use of sleeping-bags; it required a good deal of practice to get down into them with the thick clothes we had to wear, for while sleeping we had to be clad in as many clothes as possible.

The 25th May dawned with the same hopeless overcast sky as before. Now and again we had heavy snow-drifts. The temperature was about −10° C. After having tried in vain to start the aft motor, Omdal had to work some time at the engine, but still it would not start. At 10 a.m. they signalled from N.25 that it appeared as if we could now manage to get to them, if laden only with small packages and taking extreme care. We replied that we first wanted to try our engines, and endeavour to get N.24 on to the ice-plain beside the tent, where it would be quite safe under any circumstances. We therefore started to prepare a slide over which we could push the machine. Whilst busy with this we received a further communication from N.25, that they required help as soon as we were ready to give it. We replied that we now expected an early result, and that we then would cross at the first opportunity, in order to help them.

Meantime the aft engine was out of order and remained so. Compression was poor and Omdal poured

buckets of warm oil on the valves, lighting all the Thermix apparatus and setting them in the motor gondola in the hope that the engine might start. The water-lane where we had landed was now nearly closed, and the icebergs on the other side were encroaching nearer, so that the situation was not particularly bright. Until now we had lived only for lunch and dinner, eating the travelling provisions which Director Knutsen had given us and taking a cup of chocolate as well. For dinner we had a cup of pemmican soup, but instead of using $1\frac{3}{4}$ tablets per man, which was the original calculated ration, we only used 2 tablets altogether. In order to be on the safe side we started rationing the biscuits, by allowing each man six biscuits served in threes, twice a day, although none of us expected then that we should remain here for weeks.

After a hard day's work we sat again in the tent enjoying a pipe of tobacco after our evening meal, when I started to blink as my eyes suddenly began to smart. At first I thought it was the smoke, but the smarting did not stop ; it got worse and worse. Tears flowed slowly and scaldingly. There could be no doubt about it. I had become snow-blind. It had come on me without any warning. We had had an overcast sky and snow most of the time, but it had never dawned on me to use snow-glasses. It seemed, therefore, that I would have to lie like a wreck, for a few days, and I admit it now seemed to me that the situation was fairly precarious. I did the only things possible, namely, to get into my sleeping-bag and shut my eyes. Notwithstanding the pain and the trepidation, nature craved its right, after the last day's toil and mental strain, and I slept soundly. Late in the forenoon the following day I wakened somewhat confused in my head. To my great joy I could open my eyes. I noticed that it was

12 o'clock, but whether day or night I did not know. The other two slept, but as Ellsworth awakened at that moment, I learned that it must be midday, as he had crept into his sleeping-bag about 11 p.m. and had slept a long time. My eyes pained a little, but I could see all right, and I put on my spectacles immediately. We had a quiet meal and then arose the question of how to get the engine working. We worked and worked, but there was no result. Probably it had been so warm that the valves must have got jammed, and it would take Omdal a week to take the cylinders off and put things right. After this discovery there was only one thing to do. We must secure the machine in the best possible way and try to get across to N.25. We presumed that with united efforts, we could have it ready for flight in the course of a few days, and then Feucht could remain with Omdal and help him to get the aft motor going.

We started the first motor, therefore, and with the help of this got the machine as far as possible up the slip. Ellsworth and Omdal worked like heroes in order to turn the machine, whilst I worked the engine. But what could three men do with such a heavy machine? We got it well up, on to the ice-floe, so that only the after-end and part of the propeller remained in the water-lane. It would not sink now in any case, and the new ice outside would in all probability prevent the drift-ice from getting near it, while we were away. We considered under the circumstances that it was lying in as safe a position as possible, and we got ready to go across to N.25. The ice in the water-lane did not look very safe and N.25 had drifted somewhat nearer. We lightened our packs, but they still weighed 40 kg. It was impossible to know beforehand how long the trip would take us. First there was one thing and then

another which we thought we ought to have with us. Off we went right across the water-lane although it presented such an uncanny appearance. Omdal led. I followed, and then came Ellsworth. As soon as we had to leave the new ice, it was a case of climbing up and down high icebergs, where in addition to other things, we had to carry our skis. We remained as near as possible to the edge of the water-lane, and everything went well until we were near to the other machine. We were already going to start boasting, as we had no idea of any danger, when I suddenly found myself immersed in the water up to my neck. I noticed that my skis had disappeared, but my knapsack, which weighed 40 kg., was very embarrassing. I shouted loudly, as soon as I fell through, and Omdal quickly turned round. I had hardly seen his face, when he also disappeared like magic. There we both were. I managed to get my gun up over the ice, which had broken several times under my hands. I got a good firm hold and remained as quiet as possible, because I knew that Ellsworth would soon be with me—unless he also tumbled in. The current was strong and pulled my legs up in front of me under the ice, so that my boot-tops actually touched it. To get out by my own efforts with the heavy knapsack was hopeless. I was not going to risk getting rid of my knapsack, before I knew how it stood with Ellsworth. Omdal called for assistance in the hope that the crew of N.25 would come and help. In a little while Ellsworth, who had saved himself by getting out of the water-lane, came to my rescue. He came creeping along, and handed me a ski which I got hold of, and by its help I wriggled along to the edge of the firm ice. In a second I managed to slip off my knapsack and its precious contents, and got it on to the ice, and I scrambled up after it with

Ellsworth's help. Then Ellsworth dashed off to Omdal, who was getting weaker and weaker. I stumbled on to my legs and ran as quickly as my tired condition allowed me. Omdal was so exhausted that it was exceedingly difficult to get him out. I got my knife and cut the straps of his knapsack, whilst Ellsworth held him up, and with our joint efforts we at last got him safely on to the land. He could not stand on his legs. We had both had a narrow escape, and we have to thank Ellsworth's self-possession and quickness that we escaped with our lives. The honour which he received later—the gold medal for bravery—pleased Omdal and myself as much as it pleased him. It was well earned.

Our foresight in unstrapping the laces of the skis and putting our boots loosely into the ski-shoes, and by putting on our air-filled lifebelts, was what made it possible to save us at all. How we blessed this, our own farsightedness! By way of curiosity I may mention that Riiser-Larsen and I, bought the lifebelts in Bodö, just as we were on the point of starting. A man came on board and announced himself as the manufacturer of the lifebelt "Tethys." He brought a sample which appealed to us, and so we ordered six belts. It is strange how life is full of chance actions which lead to fateful results.

About forty minutes after the accident, we got along to N.25. We received a hearty reception, and as Omdal and I got a good drop of spirit and some dry clothes, we soon started talking. Answers to innumerable questions tripped off our tongues. I can well remember that I said: "I am glad to see you again," when I pressed Roald Amundsen's hand. It is a saying which generally does not mean much, but I believe Amundsen understood. It was an expression of gladness at being again with our beloved leader, whose insight, experience

and great capability, in conjunction with his untiring energy, which overcame all difficulties, expressed itself in these few words and still more in the handshake. I have the impression that Amundsen's few words to me, "Same here" ("i like maate"), were just as sincere. All three of us from N.24 had arrived with a whole skin, and we could report that the machine in the meantime at least was safe, and, with our combined efforts, could be got ready to start in a few days' time.

N.25's position was such that only our united strength could save it from its precarious situation. It had made a forced landing and was lying worse than N.24, but both its motors were in working order. If the machines had by chance separated, instead of coming close together, we would probably not have been able to get into contact with one another, and one crew, unless reinforced by the other, could hardly have managed to start its machine alone.

Even now, although we were six men all told, it seemed to us something of a riddle how we, with our primitive implements, should manage to get the machine on to the great ice-plain, which meanwhile was our goal. But just in this difficulty, our leader's wide experience and inventive mind was put to its full use. It became apparent that if six men are working on a matter of life and death, they can accomplish the unbelievable. Most of us soon knew that our only salvation lay in getting one or both machines in a good position to start. A march southwards would (no matter which way we chose) have very little chance of success.

Our work and our mode of life in the weeks which followed are described in another chapter, so I shall only add that we were disappointed in our hopes of being able to get N.24 ready, as soon as we had finished with N.25. Instead we had weeks of strenuous work to get

N.25 into readiness for flight. It was absolutely a game of "cat and mouse," but it was a game in which life and death were the stakes.

The thought of leaving our machine there behind us, in the ice, was very bitter at first. But as time passed and we saw the difficulties we had to contend with on every side, the bitterness gradually got less and less—especially when we found that it would be necessary to use N.24's supply of petrol to augment the other supply for the homeward flight, and for the various attempts to start which had to be made before N.25 finally got clear away.

I might mention, too, that the absence of landing-places made it seem advisable for the return journey to be accomplished with one machine. The risk of having to make a forced landing would thus only be half as great, and the forced landing of one of the machines would have meant a catastrophe for the whole expedition. (I personally did not share this opinion, for, in spite of the misfortune to the aft engines, my trust in both of these was great, as they had gone like clockwork during the entire northward flight.) Circumstances, however, settled the question of choice, and as we at last, on the 15th of June, found ourselves in our right element again, it was only a passing thought which we gave to our dear N.24 as it disappeared behind us in the fog.

L. Dietrichson.

Testing the Bulb Sextant.

PART IV

WHILST WE WAIT

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WHILST WE WAIT

Leaves from the Diary of Fredrik Ramm.
From May 21st to June 18th.

NY-AALESUND, King's Bay. Thursday, 21st May. —Now they have gone! The daring journey has started! At 5 o'clock in the afternoon Amundsen, Riiser-Larsen and Feucht were on board N.25, Ellsworth, Dietrichson and Omdal on N.24, and we began to say farewell. Each one shook hands and got a nod of courage from all who should remain behind. To speak was impossible, because of the noise from the four engines, which had all been working for a couple of hours, making such a din that our very words appeared to be torn in pieces and thrown into the snow spray, which was whirled up by the propellers. At 5.15 N.25 glides out on to the ice. We are astonished, for there is no signal. Riiser-Larsen simply lets his engine out; the propeller whirs and the machine glides down from the strand on to the ice. The forward movement continues, and before we realize what is happening, the machine is gliding over the snow-clad plain and swings out on to the ice, suddenly giving a mighty swerve right round, and with continued speed, rushes forward. One second—or is it a minute?—before Dietrichson's machine follows? It disappears on to the ice in a cloud of snow, making us wonder whether we are standing on our heads or our heels!

But what is this?

N.24 remains absolutely still on the plain, and where is N.25 ?—There !—A little grey fleck on the ice, travelling towards the foot of the glacier. Will they have to lighten it ? No ! now it is in the air ! No ! Yes ! Yes it is ! Just the fraction of a second passes, and we know that the start is successful, in spite of the heavy load. We shout " Hurrah " as we see the space between the ice and the grey machine increasing and increasing, till at last, there, high above the iceberg, and with the sky for a background, they swing round and set their course direct across the fjord. N.24 remains quite still. We cannot understand why, and are about to cross over to make inquiries. But almost before we start the machine rises high into the clear blue sky, and follows N.25 far out over the fjord. The two machines, so far as we can judge, are about 300 to 400 metres high, with N.25 a few hundred metres in front of N.24. We hear the even humming of the engines, echoing quite clearly on account of the high hills on the fjord's opposite side ; the noise decreases—'tis now only like the humming of a fly. We follow the machines through binoculars, clearly seeing the propellers, the motor gondolas, the wings, and even the heads of the observers and pilots. Their speed must be 150 kilometres per hour. The two machines get smaller and smaller—the hum of the motors fainter and fainter. At last they have disappeared altogether. We look at the clock, they had left according to programme and are in the air at 5.22—seven minutes after N.25 glided down on to the ice—both flying boats out of sight ! Seven minutes . . . It might almost have been seven hours. So much has happened.

Later :

We remained standing as though suddenly realizing the difference in the work of those six on board the

machines and ourselves. Till now we have all appeared to be actual members of the expedition. We have felt that there was no great difference in our desires to reach a common goal. We have lived under the same roof, fed in the same mess, have shared the same work, but now the others have gone, and we have become—the land party again! The six ought to return after a few days' absence and we should again be part of the expedition. But the few hours which have passed since 5.15 this afternoon have opened a tremendous gulf between us. The six may now be fighting for their very lives, while we hang around here exactly as we did yesterday, the day before, and every other day in the six weeks we have been in Ny-Aalesund. We have suddenly become superfluous! Until this afternoon we had tasks to perform, but from now we can only wait, just like all the rest of the world, for the six who have gone—and we know that we can give them no more help than anyone else can do. We have become passive.

The humming of the motors can still be heard in our dreams; in fact, the whole occurrence appears only as a dream. Could it have really been we who saw them off? We, who are now packing up and getting ready to go on board the *Farm* and the *Hobby*, which lie ready by the quay to set off northwards to Danskeöen. The landscape is unchanged. The sun still shines high in the light blue polar sky, making the glacier scintillate with lovely colours.—But the six have gone!—At the end of the fjord's north side lies Cape Mitra—that pointed corner which is one of the best landmarks in the world.

During the evening meal on board the *Farm*, we talk of nothing but the start. We listen with pride to Schulte-Frohlinde's praise regarding the pilots' management of the two heavy machines. He says no one could

have done it better, and we agree with him unanimously, although we don't know the difference between a sporting and a bombarding machine. He has walked across the ice and examined the trails, and noted that the ice was broken into small pieces at the spot where Dietrichson stuck, and the same was the case in a 200-300 metre length along Riiser-Larsen's track before he had been able to rise. The starting track was about 1,400 metres long, and Schulte-Frohlinde says that the trail gets less and less, until towards its end it might only have been marked in the snow with one's little finger.

For the two first hours after the machines had disappeared we scanned the heavens with our binoculars, as, before starting, Amundsen had told Captain Hagerup of the *Farm* that if everything should not be in order, the machines would return again ; and if one machine had had to make a forced landing, the other would fly back to King's Bay and warn the ships to go quickly to their aid. It is seven o'clock—It is now eight, and no machine is to be seen, so now we know that all is well. Eleven o'clock, and the *Farm's* bunkers are well filled; the ship leaves the quay. Half an hour later, when the *Hobby* is ready, we steer out of the fjord. We pass Cape Mitra, steering past the seven glaciers. So far as we can see northwards, it appears to be clear. The sea lies calm as a mirror. There is hardly any swell, and for the first time in the open sea, we are all at the same moment free from sea-sickness. Westward above the horizon lies a low cloudbank. We ask Bjerknes and Calwagen what it can be ; can this grey cloud mass threaten danger to the airmen ?—No ! It can't do that, for it is only the dispersing fog which has hung over King's Bay during the last days, and which was blown away by the north-east wind, making a start possible.

During the night we passed drift-ice. We all stand on the bridge looking northwards every second.

Here we pass along the coast over which the two machines flew this afternoon.

"The small hours begin to grow." We bless the *Farm's* steward who brings us coffee, and we go to our bunks. *Farm* is no passenger boat, but we are quite happy to sleep wherever we can find a comfortable spot.

VIRGO-HAVN, BETWEEN DANSKEÖEN AND AMSTERDAMÖEN,

Friday, May 22nd.

For the rest of the night and the early morning hours the *Farm* steers northwards, along the glacier coast. At 6.30 we enter South Gate Sound, between Danskeöen and Spitzbergen's mainland, where we lie until midday. The *Hobby* continues northwards, sailing round Amsterdamöen towards Norskeöene to study the ice conditions, returning to fetch the *Farm* after the inspection. And now the two ships steer towards Virgo-havn, and we drop our anchor at three o'clock in the afternoon. The entire time on both ships we have kept a sharp look-out from the bridge, carefully searching the horizon westward and northward for any sign of life. It might have been possible that both boats, on account of motor trouble, had been forced to land, and they might be lying anywhere waiting for the ships. But on land we saw nothing but stones, snow and ice, and to westward only the long stretch of grey water broken here and there by white drift-ice.

What a desert! . . . Local partisanship in Ny-Aalesund is right when it maintains that King's Bay is the best spot in Spitzbergen. The Sound is narrow and closed in. The cliffs rise sheer from the sea; snow covers them, there is hardly the sight of a stone to break the

whiteness. But there is an abundance of birds, auks and little auks, black guillemots, sea-gulls, etc., filling the air with their screaming and chattering. They are a host in themselves. If we were only tourists, and if we had nothing else to do but to wait for the six to return, we could relieve the monotony by watching them. But we have got to keep a sharp look-out in the direction in which the two machines may return. What if we *do* see them ? It is the whole subject of our conversation. Bjerknes and Calwagen work out and discuss the meteorological conditions, studying their chart's mystic signs and wondrous curves which we others cannot understand. Now it is evening and another day has passed since the start. They may return to-day. We prick our ears at every sound, and if we are not on deck we rush out and scan the horizon towards Amsterdamöen's west point. The ordinary sounds of life on board ship keep us in a state of nervous tension, for the churning of the propeller and the humming of the engines can easily be mistaken for a returning plane.

Is there no watchman on deck ? Is there any need for us to fly out to see what is the matter simply because the steward drops a knife on his pantry floor ?

No, no, but the watchman is only human and may be sleeping.

Perhaps to-morrow ?—Or Sunday ?—At the latest Monday — four days after the start — they *must* return !

We really cannot seriously expect them back to-day. We all know that when they land they must make observations : the place where they camp must be exactly noted : the sea depth must be measured ; and they may even have to go on foot, or on skis, for the last little stretch. According to the reports of the meteorologists the weather would seem to afford them no reason

to shorten their stay, so we must possess our souls in patience.

VIRGO-HAVN, *Saturday, May 23rd.*

A change in the weather! When we went to bed at two this morning the weather was still clear. The fog-bank which lay to the west from the time we left King's Bay was stretched out over the sky. The meteorologists were very anxious about it. Northwards things did not look quite so bad. Returning from the polar basin the airmen would be able to find landmarks in the high cliffs of Spitzbergen. A few fleecy clouds were moving towards the south-west above Amsterdamöen, and did not present a very threatening appearance. But in these early morning hours the picture has totally changed. The watchman tells us that between three and four o'clock it turned thick and hazy. From all corners the fog closed in, and drifting snow filled the air, so that it was impossible to see the tops of the island's cliffs. The swell in the Sound tells us that it is only a sea storm. In accordance with the instructions given by Amundsen, the *Hobby* sets off to inspect the ice border at nine o'clock. Under the leadership of First Lieutenant Horgen the boat is to sail as far north as possible, keeping eastwards, but not sailing further in that direction than Verlegen Hook. At 11 p.m. the *Hobby* returns after sailing as far north of Norskeöene as possible, where the ice was such, that a journey further eastwards would have been attended by grave risk, therefore, the boat turned back at Biscayer Hook, returning through the Sound between the Norskeöene. Horgen, Johansen and Holm arrive after the trip, on board the *Farm.* They have seen nothing of the flying-machines, and they tell us that the ice conditions eastward are bad. Tightly packed drift-ice lies as far as the eye can see, but the weather was

lighter there than down here in the south, and visibility appeared to be much better for manœuvring with flying-machines. We play bridge the whole evening. We continue playing for two complete days. Waiting has shown us that we cannot bring the flying-machines back simply by staring our eyes out of our heads, gazing at Vest Pynten for the first sight of the heavy grey propellers. The weather has improved a little; the driving snow has stopped; the fog has thinned a little this afternoon; and the sun suddenly breaks through.

VIRGO-HAVN, *Sunday, May 24th.*

The weather is considerably better to-day. The meteorologists tell us that the weather in the polar regions appears to be good, and there is no ground for us to be worried about the fate of the flyers. It is now over three days since they left. Even the most phlegmatic on board the two ships are waiting every moment to see them return. We discuss every possibility; we think of every difficulty, and still come to no conclusion as to what is keeping them. We are no longer excited, the thrill of the first days has changed to a numb resignation. As each hour passes we seem to see more clearly what a dangerous task our six comrades have undertaken. Several of us begin to think of all the dreadful things, which might or might not have occurred, but we do not put our thoughts into words.

VIRGO-HAVN, *Monday, May 25th.*

The fourth day passes like the rest. On board the *Hobby* they have had their first false alarm. Amundsen's old friend, sailmaker Rönne from Horten, insisted yesterday evening that he saw two flying-machines appear from the north in full flight. He declared with certainty,

that he had followed them with his eyes the whole way as they came from behind Danskeöen through the fjord, until they were lost behind Amsterdamöen's west point. The others on board thought this seemed unlikely and almost impossible.

Why in all the world should they fly in that direction? Had it been southwards one might have understood it, but Rönne stuck to his point; and so certain was he that the others on board heard of nothing else, and consequently came across to the *Farm* to tell us about it, relating how they had shown Rönne a flock of grey geese flying in the same direction which he insisted the aeroplanes had taken, making him admit that he had been mistaken.

We have had a similar occurrence on board the *Farm*. It was five o'clock. The watchman stood on the bridge, keeping a sharp look-out towards Vest Pynt, when suddenly he stood still as though nailed to the deck. He shaded his eyes with his hand and gazed over the sea directly into the stream of silver which the sun was casting over the water. He picked up his binoculars.

What is it?

Another took up his glasses. There, at the spot where sea and sky met, a grey black object could be seen rocking on the water. Something seemed to extend from each side of it, which could easily have been the wings of a flying-machine. None of us really believed that it was one of the grey seaplanes we were waiting for. But all the same we fetched Captain Hagerup and told him what we had seen. He shook his head, but in spite of his doubt he went up the steps of his bridge much quicker than usual, where, looking through his glasses, he discovered that the grey mass was nothing but an ice floe, which, aided by a little fantasy, appeared like an approaching aeroplane. It is so easy to be

mistaken. Afterwards when we see grey spots on the horizon we shall know that it is either a flock of geese on their way to their nests on the cliffs, or that it is a curiously formed ice floe. Such occurrences give us a little variation in the monotony of our waiting. We have now got used to the noises on the ship, the churning of the propeller, the noise of the pump and of the engines, and pay no attention to any of them. But once we hear a deep humming sound from the coast and think it is the throbbing note we are waiting for. It is only the waves beating against the land as they wash up the broken ice, shivering it again into a thousand pieces. But all the same we stand on the deck with half opened mouths and hands behind our ears listening to the sound.

South Gate, between Danskeöen and Spitzbergen's mainland, *Tuesday, May 26th.*

The first engineer of the *Farm* told the Captain yesterday evening that our fresh water tanks were in bad condition. To get the tanks filled at Virgo-havn was not possible, so we would have to go down to Magdalena Bay, on the mainland's north-west point, and fill the tanks with ice from an iceberg we had noticed standing high and dry in the bay as we passed northwards. It was a long business. The *Farm* was steered towards the iceberg and the crew hacked away large lumps of ice which were sent flying down from the top of the ice-hill direct into the ship's tanks. It was afternoon before the tanks were full, and a shooting party which had landed returned on board, bringing with them two seals which they had shot. So we weighed our anchor and sailed away from the iceberg into brilliant sunshine over a glassy sea, turning our course towards South Gate, where we have now arrived and shall remain here for the night.

This evening we have had a long discussion as to whether it is right to follow Amundsen's instructions "to the letter" during the waiting period. His orders are quite clear. "For a period of 14 days after the start the *Farm* and *Hobby* shall lie in the fairway by Danskeöen whilst the weather is clear. Should same become hazy the *Farm* shall continue standing by, but the *Hobby* shall go north to reconnoitre the ice border and patrol eastward, but not to pass Verlegen Hook." The ships up till now have done this: the *Hobby* has been out several times, but when the weather remains clear, and visibility is good, both vessels lie at anchor as now at Virgo-havn. Meanwhile the days are passing: it is now five days since the start, and many of us think that the *Hobby*, even in clear weather, ought to patrol the edge of the ice the whole time. How can we tell what has happened? The flying-machines may have started homewards, and there is a possibility that they are short of petrol, and may have had to land in the open sea, which the *Hobby* speaks of as lying between the ice edge and Spitzbergen's north coast—they may be stranded there waiting for a helping hand to be stretched out to them.

On the other hand Amundsen has worded his instructions quite clearly. He knows exactly where he can find the ships when he returns, and he will wish to have them in the place where he has given them instructions to await him. We decide that so long as there are no weighty grounds for disobeying these orders, we shall follow them.

We shall remain here at South Gate till to-morrow; then the *Farm* will cross northwards to Virgo-havn, where the *Hobby* awaits us. . . . And it is not impossible that when we arrive in the morning, we shall see two flying-boats lying by the vessel's side.—For five days have passed! Our confidence is a little less assured, doubts

slowly develop into words. But we keep telling each other that we do not need to fear for the safety of our six comrades.

The discussions carried us on until 1 a.m. We have walked a little on deck before we turn in, and standing there, get a little illustration of how quickly the ice conditions can change. When the *Farm* anchored we could see the snow-clad fjord ice lying flat and solid as far into the bay as the eye could reach, but now the tide has turned, breaking the ice and carrying it in a steady stream of irregular lumps through the fjord and out to sea. They are driving past as quickly as a boat can row, and ice-pilot Ness is watching them thoughtfully. "We shall probably have to move out of here before the night is over," he says. "For the first of the lumps are already congregated at the side of the ship."

VIRGO-HAVN, *Wednesday, May 27th.*

Ness is right. We are hardly in bed before we hear a scraping noise alongside, and we notice that the plates are sensitive to the pressure, as the drift-ice turns against the ship. But we turn over and sleep all the same on our mattresses on the saloon floor. At three o'clock we rush on deck. We have the steering-gear right over our heads and can hear how it is working. There is a noise of the tramping of sea-boots, and the engine-room telegraph keeps insistently ringing.

Should it be . . . . . .

We had forgotten about the ice after we had gone to rest some hours ago, and now it lies tightly packed round the whole vessel. The bay, which was free of ice when we anchored, is now covered with drift-ice, and in all circumstances, Captain Hagerup has decided that he must leave South Gate at once and make for Virgo-havn.

We arrive there during the day and find the *Hobby* exactly where we had left it yesterday morning, but no flying-machines are to be seen. The *Farm's* wireless operator tells us that America is sending out pessimistic messages, as they think, after six days have passed without news, that something must have happened to the expedition. As he tells us this view down in the mess, a shock passes through us. We feel that it is not only we who await the expedition, but there are millions and millions in the five Continents who are longing to hear how much further, between the known and the unknown areas, the boundary has been moved northward, as the result of human enterprise's latest move in the eternal search for knowledge. In the few words of the American message we get certain proof, that all, who have longed to do the same things which Amundsen, Dietrichson, Ellsworth, Feucht, Omdal and Riiser-Larsen actually set out to accomplish, fear that the journey to the Pole will end in sacrifice. And the fear which we have all sought to hide now rises up in us, that six struggles against death are being fought out, somewhere between 80° and 90° N. lat. The anxiety and excitement of the outer world reflects on us, and the first uncomfortable thoughts are thoroughly discussed by us, until little by little they are dispelled. Hardly a week has passed since they left, and if we trust Amundsen's own word, there is no need to fear until 14 days have elapsed since the 21st May.

VIRGO-HAVN, *Thursday, 28th May*, 5.15 p.m.

It is now a week since we saw the two machines fly from King's Bay and disappear in the distance in the direction of Cape Mitra. The hope which we journalists entertained of announcing their return a week from the start has gone. The meteorologists have

summed up the weather conditions of the last seven days with a result which calms us.

When they started there must have been a good weather area over the Arctic Sea, with its centre not far away from the actual Pole-point. During the entire flight the machines, therefore, have probably met only the lightest winds and clear weather. In the days immediately following the start the high pressure area was menaced by a depression from the North American coast, and by a bad weather area which passed north-east from Russia to Siberia's northern coast. There must have been a light breeze blowing in the direction of Spitzbergen, but any serious change in the weather is hardly likely to have taken place. From the 25th of May (Monday) the Siberian bad weather centre passed eastwards, whilst that from Alaska passed towards Greenland. Between these two bad weather centres there always lay a high pressure area with its centre at the Pole-point.

These conditions continue ; therefore from the meteorological deductions we can come to the conclusion that good weather has existed up till now, over the ground covered by the expedition. The confidence of the scientists braces us all up. We remember also the words which the airmen said before they left—especially a remark of Riiser-Larsen's to the meteorologists, as he looked over the cliffs and saw the thick snow showers driving through the air : " Only provide us with 12 hours' good weather and we shall reach the Pole. We don't need any more to get there, but if necessary we can spend 14 days on the homeward trip."

These words we repeat to each other over and over again, and comfort ourselves with the knowledge of the excellence of the machines and their crews, and the recollection that they warned us, that in bad weather

they might only return after an absence of 14 days. Yet it seems strange that they should be so long away, when, so far as we can judge, the weather has been favourable. When Amundsen made his rush to the South Pole he could only stay, to make observations, for three days, as he had to trek back again and food allowance was limited. In this case, however, he can return to his base in eight, ten or twelve hours, so why should he jeopardize the benefit to the world's scientific knowledge by leaving his point of observation before necessity demanded? If they have found land up there, they will wish to make maps, to photograph it—to measure it—a week will soon go by. But—but—but—this little word comes up every time we try to find a reason for the delay—and yet it is absurd to give up hope so soon.

This evening a council of war has been held on board the *Farm*. An announcement has arrived from the Norwegian Luftseiladsforening that they are planning a reconnoitring expedition. Two naval hydroplanes are to be sent north to help in the patrolling of the ice borders.

Captain Hagerup, First Lieutenant Horgen, Skipper Johansen, and 1st Mate Astrup Holm are to send word at once if such machines will be of any use. To give an answer of this kind is difficult, for the ice this year lies with a broad belt of drifting ice, screwing in shoals in front of the solid ice border. Thus the hydroplanes could not negotiate this obstacle to any great distance. Should they themselves have to make a forced landing any distance from the open sea, both they and their crews would be lost. On the other hand, they would be able to fly over the entire area of the fairway north of Spitzbergen in a few hours, a distance which it would take several days for ships to cruise over, and thus they would make

the patrolling much more effective. Our answer was based on this latter consideration.

To-day it is *eight* days since they started, and we enter a new phase in our waiting time. Until to-day none of us have gone far away from the ships. The American journalist James B. Wharton, who is with us, the film photographer Paul Berge, and I had not set our feet out of the ship. We have always waited in the expectation of seeing the machines at any moment appear from behind Amsterdamöen. We have lain fully clad on our mattresses, ready to set the wireless working, broadcasting the news. Berge's film camera has stood on its three legs on the bridge, ready to turn out hundreds of yards of film. We have always kept a boat ready at the *Farm's* side so that we could row across to the flying-machines the moment they landed, and every night before we went to rest we instructed the watchman on deck that he must waken us the first moment he heard anything. But this evening as the telegraph station from the coast asked if they should keep open all night with extra supervision, I had answered that it was no longer necessary. As these words were broadcasted from the little wireless compartment, it seemed as though we had sent a telegram to a waiting world that showed them that *even we* had begun to doubt. The same doubt is felt now by almost everyone on the two boats. The possibility of seeing them come flying back is gradually diminishing. We still believe, but to-morrow our confidence will be less. We feel that on the ninth day from the start we shall give up hope. To-day it is decided, that to-morrow the *Farm* shall go down to Ny-Aalesund, partly for coaling reasons, partly to take away those members of the expedition, who wish to take advantage of the opportunity to go down to Advent Bay, whence a coal steamer can carry them to Norway. When we shall see

our comrades carried southwards while we are left behind, we shall enter into an anxious period of waiting, which will seem unending.

VIRGO-HAVN, *29th of May.*

Is the weather going to change after all? Last night it turned cloudy, and before long snow began to fall thicker and faster. The atmosphere became absolutely impenetrable, and the *Hobby* was sent to patrol the ice-border. The meteorologists think that the bad weather and invisibility is travelling across the polar basin from the northern ice, and that fog will probably cover the area up to 85° N. This gives us grounds to believe that the machines will not return to-day, for, if the airmen have observed approaching fog, they will not risk flying through it for the fear of being separated. The *Farm* sets out in the evening to King's Bay.

NY-AALESUND, KING'S BAY, *30th of May.*

We arrived here this morning. The journey down past the seven glaciers was like an adventure. As we left the Sound between Amsterdamöen and Danskeöen we saw the high, snow-clad hills of Prince Karl's Foreland —they were 100 kilometres away and blended into the clear evening air in the distance like a white veil. We followed the coast till we arrived opposite Seal Bay, and were able to observe the whole time how the light of the midnight sun illuminated the hills of the mainland with a rosy glow, so it was long before we sought our bunks. We passed the seven glaciers one by one, which lie along the coast, making it impossible to land anywhere between Cape Mitra and Magdalena Bay—for the dark brown cliffs lying between each glacier rise sheer from the sea, and here also the fairway is dangerous. Far out,

as we are, from the coast, we can see the waves break over the ground, although the sea is so calm and the swell hardly perceptible, while the *Farm* rarely gives a single roll. During the trip downwards we had coffee in company with our comrades who should now leave us. It was the last meal on board that we should have together for some time, yet the final cup had to be quickly swallowed as those who were leaving us had many things to pack. Bjerknes and Calwagen gathered their meteorological instruments together—and the Amundsen-Ellsworth Expedition's weather service came to an end. The last report they made, showed us that the weather in the polar basin had not got much worse. The depression from the North Atlantic was delayed.

We are now opposite the centre glacier and can see all seven. One of the expedition's humorists asks us if we can tell him which two of the glaciers have the greatest distance between them.

He is full of glee when we make him answer his own question, and he replies with the words: "The distance is naturally greatest between the first and the seventh!"

We stand on the afterdeck and earnestly ask the Dornier-Wal Factory's representative if it is not possible that one of the flying-machines has dashed down during the flight and crashed, and that the other has probably got damaged in landing to go to its assistance. "Nothing is impossible," says Schulte-Frohlinde; "but the chance that one machine has crashed during the flight is even less than that the *Farm* at the present moment should suddenly break her back. And one must never forget that skilled airmen are piloting N.24 and 25, making an accident highly improbable."

We are now nearing Cape Mitra and turn in for the night. As we wake this morning, we find we have arrived

at the coaling quay of Ny-Aalesund. Formerly we stayed in this little thriving mining town for six weeks, ere we left it nine days ago, yet, we have to look long at everything before we recognize the place, for while we have been away the sun and wind have altered its appearance, and left their mark on it in every direction. The ice which had lain beside the quay to a thickness of eight or ten inches, was now only mush ; the rest had been carried away to sea by the currents and the tide. On the other side of the fjord the fairway is clear and open, reaching to the foot of the glacier, and on the Ny-Aalesund side the ice has got so thin that it will hardly bear the weight of a man. The track which the flying-machines had glided over is now clear of ice and people ashore tell us that it was not many days after the start before the ice broke up entirely. We have hardly finished breakfast on board, when the expedition's good friend, Director Knutsen, comes on board to hear the news. We have not much to tell him, but what we relate never shakes his confidence in the least that the six will return to Ny-Aalesund, and that this tiny outpost of civilization shall see the beginning of their triumphal procession southwards. He declares further that so long as he is on the spot everything shall be ready to receive them, or to minister to their needs, and the table shall be spread within half an hour of their setting foot in Ny-Aalesund. Greetings shall thunder out and every flag the town possesses shall be flown mast-high. Everything is ready ! Just let them arrive ! His confidence infects us, and by the time we sit at the luncheon table, we all take a brighter view of the situation. And this, although it is Saturday, nine days after the start—the day we should have begun to doubt in earnest.

NY-AALESUND, KING'S BAY, *Sunday, May 31st.*

This evening the first of the party, who arrived here on Easter Day (April 13th) with the expedition, set off southwards. To-day is Whit Sunday, seven weeks have passed since the *Farm* and *Hobby* sailed to the ice border—5 kilometres in front of the quay where the *Farm* now lies. It is a bitterly cold day—the air raw, and a biting wind stinging one's face and blowing through even the thickest clothes. During the entire day we have had a clear blue sky, which acts as a background to the three mountains, Nora, Svea and Dana, the peculiar formation of which in the strangely clear atmosphere makes them appear to be only a stone's throw away and not 30 kilometres from the spot where we stand on the quay.

Towards the entrance to the fjord we see a long heavy smoke cloud; it is the farewell greeting from the ice-breaker *Pasvik*, which is carrying our comrades away.

There were originally twenty members in the expedition which came to help Amundsen. He and five others flew into the unknown on the 21st of May. Here again in Spitzbergen are Horgen, the chemist Zapffe, the film photographer Berge, the journalist Wharton, the steward Einer Olsen, and I. On board the *Pasvik* are Director Schulte-Frohlinde, Dr. Matheson, Dr. Phil. Bjerknes, the meteorologist Calwagen, sailmaker Rönne, the engineer Green, the mechanic Zinsmeyer, and the meteorological telegraphist Devold, sailing southwards.

The twenty of us were not gathered together for so very many weeks, but it is not the duration of time which determines good feeling amongst men. The occurrence through which we have lived has bound us together with mutual memories so exalted, that even if we should never meet again there will always be a freemasonry amongst

us. We saw six men in two heavy grey machines place themselves in the hands of Fate, a Fate more relentless, more unknown than Columbus and Vasco da Gama encountered. If we should meet each other under different conditions we should never be at a loss for a subject of conversation, for we would always fall back on the eternal "Do you remember . . . ?" by way of an opening.

For the last time we all dined together with Director Knutsen to-day. A feeling of depression lay over us all in spite of our host's sturdy optimism. We should soon be parted, and no longer could we hope, in each other's company to witness the great home-coming. As Dr. Matheson thanked Herr Knutsen in a little speech for all his kindly hospitality, we are not ashamed to admit that we were weak enough to have lumps in our throats. As we sat there we heard the shriek of the *Pasvik's* siren. Two hours afterwards, all the baggage, many hundreds of photographs, and 2,000 metres of film taken in the north, were put on board the icebreaker. We exchanged hand-shakes and greetings. The *Pasvik* drew off from the quay; there was a waving of handkerchiefs and scarves . . . and the last we heard from those on board was the remark of Schulte-Frohlinde: "Don't come southwards before you have Amundsen and his five companions with you."

The *Pasvik* had brought several mail-bags for the expedition from Green Harbour. Some were for the land party and some for those who had left. There were private letters for every one of us, and several were addressed to "Roald Amundsen, The North Pole," from all corners of the earth. There was a large pile of newspapers from different lands in which we read, with great interest, comments on our plans for the flight, and the progress of our work before the machines started.

VIRGO-HAVN, *Monday, 1st June.*

We left Ny-Aalesund in the evening, yesterday, and arrived here again this morning after a fine trip along the coast past the seven glaciers, to which we bowed as though they were old acquaintances. The *Hobby* lay in the bay—alone! We have given up hope of seeing the machines again. Whether we see our six comrades again is a subject I dare not think about. There are two possibilities—Either both machines have been damaged hopelessly in a landing on the ice, and their crews have set off on foot to Cape Columbia in Grant's Land, west of Greenland's north point, or, the petrol supply came to an end on the return journey, and they are now probably trying to cross the drift-ice towards Syvöene, north of Northeastland. If they have done this it is possible that one of the vessels may catch sight of them when they begin patrolling the ice border next Thursday—the 14th day from the start. We take the charts from the boxes, and study the long route over which they will have to pass to reach Cape Columbia, and therefrom, down to Thule on the north coast of Greenland. It is a distance of 1,600 kilometres to walk and to row, so we know that, if the machines have been damaged in the landing, we shall not see our comrades again till 1926. The canvas boats they have taken with them are so small that there is no possibility of them being used for a crossing between Greenland and Grant's Land, over the Kennedy Channel, if the ice has broken up, which it generally does in the month of July—and there is no chance of them reaching Cape Columbia before the end of June. Therefrom they would have to go down to Fort Conger in Discovery Harbour, from whence they must cross the Kennedy Channel (a march of several weeks).

If they are on the way to Spitzbergen and are crossing

eastwards to Northeastland, it will also take many weeks, but there is the chance that they may meet with one or other of the seal hunters, who trek northwards and eastwards at this period of the year—or they may trek down the coast and in the late summer surprise us by appearing in Ny-Aalesund or Advent Bay. Under these conditions we, on board the vessels, feel that we are more superfluous than ever. We think with envy of our comrades who set off on board the *Pasvik* southwards to Norway—to summer, with green-clad mountain sides, and birds singing in the woods,—to warmth, and to a land where one day sleeps before another is born—in light and in darkness. Yet here we must remain for another four weeks amidst snow and ice, sleeping in uncomfortable bunks, and tramping the same deck planks in a pale unwavering light which saps the remaining calmness from one's nerves. We have grown to hate the midnight sun; it gives light pale as a white-washed hospital ward, yet so strong that it is difficult to bear. Through the smallest holes and cracks in the port-hole curtains, it pours in like Röntgen rays, and burns one's very soul and eyes. It has the same effect whether it is day, or whether it is what we, from force of habit, call night; either the sun shines from a blue sky, or grey clouds scurrying before a bitter nor'-easter hide that same sun, which in the south is making the grass grow and the birds sing love-songs from the tops of the beech trees.

I wonder if the others have the same thoughts. Now that the strain of the early expectation is over, and that a waiting period, which I believe cannot bring a solution to the situation, has started, the entire work of patrolling and reconnoitring from air and sea has become so colourless;—colourless and monotonous as the sea and the cold naked hills, with their glaciers and their snow-

drifts in the dales. The deck planks are being worn down by incessant tramping. We wait, first for breakfast, then for lunch, and then for our evening meal. We say the same things, look at the same views, and we play cards. I get the same cards always and lose consistently. —And this is only the first day.—On Thursday, three days hence, we are to begin patrolling in earnest.

VIRGO-HAVN, *Tuesday, June 2nd.*

Our water supply is very low. To take ice on board is impracticable. Down in the dark tanks the water only keeps a few degrees of heat, the ice melts so slowly that in the after-tank large lumps are still lying unmelted, since we put them in the tanks at Magdalena Bay. In a handbook of Spitzbergen, which is found in the ship's library, Captain Hagerup discovers that at Seal Bay there is a small lake which never freezes to its lowest depth. Perhaps we can get water there. The motor boat is lowered, we take out guns and ammunition, and accompany Hagerup and the ice-pilot shorewards. Seal flesh is not altogether a luxury, but it is at least fresh meat, and the steward on board has shown us that auk can taste like ptarmigan when the gravy is made with cream and butter. We push off, and the little trip to Seal Bay seems almost as exciting for us as the reading of a thrilling novel, for it is such a welcome change. The boat can approach quite near to land, where the *Farm* cannot steer, as there are many sand-banks and rocks, unmarked on the charts. Lying in the Sound just before we swing round and down the coast to the open sea is a little island, no larger than the floor of an ordinary sized room, 10 or 15 metres from Danskeöen. It is three or four metres high and has a skull-cap of snow, on which is perched a large sea-gull looking down at us. The bird is

so glistening white that the snow appears like a grey shadowed background for the heavy bird. As we approach it flies upwards with long sweeping wings, and with a hoarse scream disappears seawards. From the boat we can see on the top of the snow-cap a green egg which is lying there.

There is a history attached to this little island—sad as are so many of these fateful stories of the North. One winter before Wellman set off in his balloon he had his big balloon shed ready, and in another of his houses which stands there, were stored provisions for a long period. He had engaged two watchmen to look after his belongings. They spent the time trapping fox, which at that time were to be found on Danskeöen in great numbers. The two watchmen (Bjorvik and Johnsen, they were called) wished one day to go out to the little island. The Sound between it and the land is 10 to 15 metres broad. It was in the month of May. Johnsen went a little in advance of Bjorvik, who suddenly saw his comrade disappear through the ice. Johnsen called for help, but before Bjorvik could get to him the ice broke up entirely round the spot where he was, and the stream carried him away under the ice, while Bjorvik could only stand helplessly by, and look on. He lived there alone afterwards for a long time before a ship arrived from Norway. For the greater part of the time he sat by a signalling post and stared out over the sea. He kept a diary of his life there : " It is the second time I have had to see a good comrade die here in the north," he writes, " but this is worse than it is in Franz Joseph Land ; I must pull myself together and find something or other to do." His remark applies to a time when he had lived ten years ago on the above mentioned island, when he and a man from the *Fram* named Bentzon spent the winter there. Bentzon got scurvy and died. So

that his corpse should not be eaten by bears or fox Bjorvik kept it in the little hut beside him for several months, before a vessel came and carried him and the dead man away to Norway.

Whilst this is being related we steer out of the Sound. We round Danskeöen's north-west point and turn down the coast past several 400 to 500 metre-high cliffs rising direct out of the sea. The waves toss the motor boat up and down and wash over us. We send a shot toward the cliffs, the echo reverberates and thousands of auks fly out. We pick up our fowling-pieces and aim at the birds which fly past in a whirling flock, and we anticipate having auk for lunch. But we miss our mark, for motor boats are not built with the idea of their being a shooting ground for auk! We get proof of this when a shot aimed at two birds falls direct into the sea, sending the spray flying. The non-sporting men in the boat rub their hands with joy when they see the birds escape from the bloodthirsty marksmen. Occasionally we shoot a brace of puffin; the small black and white birds with red parrot beaks always lie rocking on the waves, and are an easy prey. They are clumsy flyers and never try to escape until it is too late. We turn into Seal Bay, and as we enter, the rolling ceases, for there is a sand-bank which acts as a breakwater and beyond it the water lies like a mirror. It is so clear that we can see the fine white sand at the bottom, where the seaweed waves about in the gentle current. Here we are able to note that the water in the neighbourhood of Spitzbergen must indeed have become warmer in recent years, for scarcely ten years ago it was a rare thing to see seaweed growing so far north. Now it can be found on the sea-bottom of all the bays where current conditions are favourable.

We go ashore and try to break the ice on the lake.

We hack and hack but never get through. If this lake is not frozen solid it is at any rate frozen to such a depth that we shall require other tools to get through the ice. As we return to the motor-boat Captain Hagerup points to a little hillock, saying : " That is where we found the bodies of two meteorologists, who drifted here in an open boat from Quade Hook, on the way to King's Bay, and lay here two months, where they slowly starved and froze to death."

We return to the *Farm* at 6 p.m. It seems to us that we have as much to tell those on board as though we had been away three weeks, instead of only three hours. The sportsmen, too, receive grateful thanks for bringing auk with them, " which taste nearly as good as ptarmigan."

A telegram awaits us on board saying that MacMillan is to start his expedition on the 20th of June from Boston—to search for Amundsen and his companions, north of Cape Columbia. We comment on this. If the ice conditions in the north are favourable he can be in Etah with his ships and flying-machines by the end of the month or the beginning of July, and by sending his flying-machines northwards from there he can probably sight our airmen if they are walking towards Grant's Land.

And why should they not have proceeded so far ? The accounts which Peary has given of the ice conditions between the Pole and Grant's Land show that it is even and flat, so that a long day's march is possible. His accounts are backed up by the trappers, who describe the condition of the ice as it drifts towards Greenland's east coast. There great floes can be seen, many kilometres long, and without the slightest mooring. We recall to memory what Amundsen said to Ellsworth one day, when we walked on ice as flat as a floor :

"Landing-places like these are numerous where we are going." Now we know that even if the machines have been damaged in landing, the airmen will still be able to walk many miles a day on the ice until they see land ahead.

And we reason further: even if one or two men have been so hurt in an unfortunate landing that they must be helped by the others, the sledges are not so heavy, but that they can be pulled along, for all of them have the will and the strength to get home. The more we discuss the point the more sure we are that there is a chance of the MacMillan expedition joining up with our six. How astonished they will be to hear of all the plans which have been made to search for them, for they count on no help whatever (certainly not from Norway, for they understood that they had got all the help they could from there when the State aided the actual expedition). Twelve days since they left us!—in two days the *Farm* and *Hobby* must begin to patrol the ice border.

VIRGO-HAVN, *Wednesday, June 3rd.*

The weather during the last days has been clear with good visibility, and the airmen would have found no difficulty in steering for Spitzbergen, as the high mountains must have been discernible for several hundreds of kilometres, from the height at which the aeroplanes would be flying.

But to-day there is a change. When we came on deck at 9 a.m. we found a real polar fog around us: heavy, raw and forbiddingly grey it lay over the *Farm*. The smoke could not rise, and soot fell everywhere. Every breath filled our lungs with grime instead of the usual sparkling air. Although we only lay 200 yards from land we could not see it. When it was at its worst

we could only just catch a glimpse of the *Hobby's* clumsy hull, which lay just ahead. Our spirits were not so heavy as the fog ; even the crew found something to keep them interested.

This evening a telegram arrives, to say that America is forming a Committee to arrange a search for Amundsen in the neighbourhood of Cape Columbia. They are collecting the necessary funds. A brother-in-law of Ellsworth's is a member of the Committee.

VIRGO-HAVN, *Thursday, June 4th.*

Now the fourteen days have passed during which we should lie here in the fairway, according to Amundsen's orders, and wait for the airmen. The *Farm* should now continue a course westwards from the northern coast of Norskeöene, as the boat is not constructed for ice navigation. The *Hobby*, on the other hand, is built of wood and has a strong ice-bow of solid oak, and can safely follow a course eastwards along the ice border, probably being able to reach Northeastland. As soon as the *Farm* has got her tanks filled (which should be by to-morrow evening) the patrolling shall begin. We shall remain here in the north till the 2nd of July—six weeks from the start (that is the limit Amundsen fixed for the airmen to return to Spitzbergen on foot, or in the small canvas boats), after which the last members of the Amundsen-Ellsworth expedition were to set off southwards.

This afternoon we live through an occurrence which smacked of sensation. The fog had lifted and there was only a slight thickness remaining on the high points of Spitzbergen's mainland, the rest had been blown to sea by a fresh breeze. Now visibility is good. We have just drunk our coffee and come on deck, and we suddenly notice a little boat rowing towards us. Instinctively

we lift our binoculars. There are two men in the boat, which lies deep in the water. Apparently it is one of the *Hobby's* "seal-boats," which has probably been out and caught a number of seal. The boat approaches, rows past our ship, and lies by the side of a little hut on the beach at Danskeöen. This hut was built by a Scottish scientist, and is called Pike's House, after him. The two men land and empty the boat of its load. We realize that they are two trappers whom the *Hobby* has met in the course of her patrolling near Norskeöene, where they have remained since autumn trapping bear and fox. In a short time they come on board to learn if they can possibly find a ship to carry them southwards.

With true polar hospitality we invite them to have coffee with us and tell them the news from the outer world, which they have not been in touch with since September. They listen with the same interest to our news, as we do to their tales of the life of a trapper in the polar night. They have kept diaries and have made notes of wind and weather.

We borrow their diaries and read their accounts of the weather about the time of the start. They have made the following notes: May 18th. Calm, air very thick, 3° C. frost. 19th May. Fresh easterly wind, cloudy air, 4° C. frost. 20th May. Slight north-east wind, atmosphere thick, a little snow, 3° C. frost. Afternoon, Fresh, easterly, snow. Evening. Easterly, snow, 5° C. frost.

Thus we arrive at the starting day, which gave us the brilliant weather the airmen were waiting for, and which the meteorologists believe continued straight to the Pole.

In the diary the notes were: May 21st. Fresh, north-east, atmosphere thick, and snow, 7° C. frost. Evening. weather conditions the same, 8° C. frost. On the following

day, May 22nd, when the *Farm* and *Hobby* came northwards, they had noted clear weather in their diaries. These trappers' diaries give us a new subject for conversation. If their observations are correct our airmen must have flown into thick fog opposite Danskeöen and Amsterdamöen. Supposing they followed a northward course after passing Amsterdamöen, it is not likely that the weather could have changed extensively between there and Norskeöene, especially with such a wind blowing as the diaries describe. We discuss it from every point of view, and arrive at the only possible result. Around Spitzbergen's north-west point and the islands immediately near it there has been a local storm on the day of the start. The airmen could not have missed seeing it, and the fact that they have continued northwards in spite of it, is because they have seen clear weather ahead in the polar basin, where they could make use of their sun-compasses and deviation-measures for navigating. The trappers are of the same opinion—one of them has spent many winters in Spitzbergen, and tells us that the weather conditions there are often quite different to what they are a little further south. The two trappers row away to their hut, where they intend to live until the *Farm* goes southwards to coal, when they will accompany us in order to join a coal-boat from Ny-Aalesund to carry them to one or other Norwegian port. They will sell the two polar bear skins and thirty fox skins from their winter's trapping and will live on the proceeds for a few months in Norway, then return to Spitzbergen again when they wish to gather a fresh harvest.

In the evening we hold a council of war in the *Farm's* mess regarding the patrolling, and we arrange exactly which parts of the fairway each boat shall cruise over. The first trip is to begin to-morrow, Friday, June 5th,

continuing until June 9th, when at eight o'clock on that day the *Hobby* and *Farm* shall be back in Virgo-havn again. There is a little difficulty about the fact that the *Hobby* is not fitted with wireless, and for this reason we have made the first cruise of so short a duration, as word may come at any moment which would do away with the necessity for further patrolling.

Hardly any of us believe that there is a chance of our picking up the airmen. With such good flying-machines there is hardly any doubt but that they must have reached the Pole before they had to land. Therefore we conclude that any accident can only have taken place where they have landed at the Pole point. It will thus be a shorter distance to Cape Columbia than to Northeastland—especially taking into consideration the fact that the going is easier over the flat ice towards the American coast, than scrambling over the screw-ice north of Spitzbergen. From what the airmen said before they left it was their intention to return to Cape Columbia, and we had often noticed in King's Bay, during the conversation, that Amundsen himself always counted on the possibility of coming home on foot. Every small item of the equipment, which could be required on a march, was gone through most carefully by Amundsen himself, and tested and examined over and over again. He thought of everything, but when we remember what a small space, the entire equipment for a march, took up in the two machines, it seems impossible that six men could have had enough material to keep life and soul together and get clear away. But Amundsen has experience from former years. . . .

The first part of the waiting period was over. The thought of the last fourteen days arouses a chaos of memories and sensations. The last lunch in the mess on the starting day, three or four hours before they left,

seems to be as far away as a childhood's memory. We sat round the long table talking as usual, when suddenly the six men got up, saying: "It is time we put on our flying-clothes," and the whole occurrence appeared so natural to us all, that many of us remained to drink an additional cup of the extra fine coffee, which the steward had made for the occasion.

And thus they started, and we passed impatient days of anxious waiting to see them return. And now we can hardly understand our first great confidence. It seems to me quite impossible that for ten or fourteen days I could have believed in their homecoming with a certainty as firm as that of the six themselves. But should a miracle happen on the other hand, and we should suddenly see them flying towards us, and hear the thrumming of their engines, it would seem to be the most natural thing that could take place.

VIRGO-HAVN, *Friday, June 5th.*

The *Farm's* crew have continued filling the water-tanks to-day. They fill the lifeboats with fresh water ice and the motor-boats tow them to the ship's side, where they empty bucket after bucket into the tanks. They are finished by 5 p.m. and they are ready to sail northwards.

The weather prospects are good. The frost is over for this year and one can see the bare patches amongst the snow growing bigger and bigger, as it melts and runs away down the hillside in several little brooks, which increase in size as they descend, carrying gravel and sand right out to sea. A wide stretch in front of the beach is muddy and thick in rainbow sections, with one part grey, another brown, turning into red or yellow, according to the colour of the mud which the hill stream has carried

with it. The weather is mild and we no longer require our mittens and leather hats. When we take a little walk ashore, we have not gone far up the hill before perspiration breaks out on us.

This barren Virgo-havn which we came to a fortnight ago, and which seemed so deserted, has now awakened to life. Even unaccustomed eyes can see how the birds are preparing for the joys of family life. The capercailzies, which were arriving in flocks when we first came, are now settling down in pairs—the dark brown hen flies seawards with a crooning note followed by her mate. With a splash they alight on the water by the side of the island, where they land, and together search like two everyday citizens for a suitable nesting-place. A flock of little auks flies throughout the day round a high hill-top which rises from the beach. Their wings fill the air with a whirring noise, and their squawking nearly deafens us as we pass near their nests, for they are apprehensive of our intentions. Large plundering sea-mews swirl around overhead in the hope of espying an egg.

Yes ! spring is really here, taking hold of this island, where conditions of life are so poor that only a great thaw gives anything a chance to grow.

The last boat-load of water has been towed to the side of the *Farm ;* the whistle recalls those of us who are ashore, and we see that the vessel is ready to leave. Everything on deck is secured and fast. The photographer Berge, Wharton and I shall go eastwards with the *Hobby* towards Northeastland, where the chances of meeting the six are greatest. We pack all our belongings together and row towards the *Hobby*, as the *Farm* is to leave in half an hour's time.

The "Hobby," Saturday, June 6th.

At 6 p.m. to-day the *Farm* steamed off and disappeared along Amsterdamöen's east coast. The *Hobby* made ready for sailing and at eight o'clock we followed. To begin with we kept to the same course as the *Farm*. The weather was not of the best. Visibility was fairly good, but the sky was covered with grey, low-lying clouds, while the air was damp and heavy. A nor'-easter made our position on deck anything but comfortable, but the mere fact that we were moving, engendered a satisfactory feeling and we sat up late into the night. Leaving Virgo-havn we got a good chance to study, on Spitzbergen's mainland, how the glaciers here in the north, have diminished in recent years. In one of the dales we can see the remainder of a glacier which not so many years ago reached right down to the sea. Now there is hardly a small ice hillock left of it. The neighbouring glaciers have also shrunk and no longer fill the dales as they did formerly. We remember that our friends in King's Bay told us, that the large glaciers in the bay have moved 1,500-2,000 metres further out than they were ten years ago, when the coal miners first started to work. During the trip through the Sound we are accompanied part of the way by a young seal, which unconcernedly swims by the side of the vessel regarding us curiously with black shining eyes. Our sporting instincts awaken—we have no intention of shooting a young seal, but the sight of it reminds us that there will be plenty of sport further north, where at this time of the year seal are plentiful. It is not impossible that we may also bag a polar bear or two. The *Hobby* in the meantime has passed Singing-Bird Island, which could hardly have borne a more fitting name. Town dwellers who are on

board the vessel, to whom fifty or sixty sparrows appear as a *crowd* of birds, have always listened with scepticism to the tales told of flocks of birds, so dense that they obliterate the sun. As we pass the island we get a proof that these tales have not been exaggerated. I admit that there was no sun to obliterate, but round the high island we can see flocks of auk flying in such numbers that they look like big black thunder clouds driving before the wind. We turn into the Sound, passing Norskeöene, and lose sight of Amsterdamöen's double-peaked top. In a small opening between Singing-Bird Island and Cloven-Cliff Island we catch sight of the *Farm*. It is lying still, and it would appear that the officers on board have begun their hydrographic work. They are quickly lost to sight as we pass Outer-Norskeöene, where we see thousands of capercailzies flying backwards and forwards.

When we return after three or four days' absence we shall be able to gather enough eggs to last us a lifetime. The island is famed amongst trappers as being one of the best nesting-places on Spitzbergen. It is almost as good as Moss Island at the entrance to South Gate and Dunn Island outside Horn Sound. Through the glasses we can see that the capercailzies are busy building their nests—the most fortunate of them have found places to build in the crannies of the broken ice heaps. Coming out of the Sound we have the whole polar sea lying in front of us. Up till now fate has provided, that we should only see the water calm and in sunshine. (Although we had a storm crossing from Tromsö to King's Bay, it is so long ago that we have forgotten it.) Now we get raw, cold and stormy weather. The sea is not blue and pleasant looking, but grey and heavy as lead. The waves toss the ship about, and we have to hold fast to anything near us to prevent ourselves being slung overboard, whilst from the pantry we hear

kitchen utensils and cooking-pots crashing about accompanied by the steward's high-pitched curses.

We don't see much ice. Here and there a small floe, or a patch of mush, rocks past on the waves, strengthening the impression that this deserted sea stretches to the world's end. During a sea journey in the south, even if land is not to be seen, one knows that in a few hours a strip of coastline will appear—and behind that coastline there is land, with people and life and new things to see, to hear, and to learn, which give the journey a purpose! But this sea! It stretches northwards and northwards. The heavy, lead-grey mass of water is never broken by a bit of smiling coast with green-clad mountain sides or high hills, but goes on in an endless monotony of drifting ice. As it lies before us now it has no charm; it only repels with its cold indifference. We prefer not to look at it, and go down into the little saloon, where we, who have come from the *Farm*, are delighted to find that here also, they have the praiseworthy habit of serving coffee at night whilst the ship is at sea.

We go to bed at ten o'clock, after which the engines stop and the *Hobby* lies drifting through the night (it is just as well to spare our fuel). As we settled down for the night the *Hobby* lay a little north-west of Mofföen, almost direct north of Welcome Point in Reindeerland.

When we wakened about 10 in the morning, we still lay drifting, for towards morning a heavy fog had descended and it was useless to try to proceed. It would be impossible to see our course and to get a sight of the airmen was equally out of the question in such density. The fog we experienced in Virgo-havn some days ago was nothing compared to this, which seemed like a mass of thick wool enveloping us. There was no rest for the eye, no gap in the foggy curtain. How long will it last?

People who know the conditions here shrug their shoulders . . . There is nothing to be done but to remain where we are. There is a little snow shower which does not improve matters. Should the weather remain like this, it seems to us that a reconnoitring expedition will have to be sent to search for us as well.

We go down, throw ourselves on our mattresses and sleep !

An hour or two after lunch time and the fog has lifted a little. We can see several ship-lengths ahead, and above, it is distinctly clearer ; the sun is still shining behind it all. A few ice-floes pass out of the density and we follow them gladly with our eyes as they serve to break the awful monotony. A small breeze begins to blow, bringing us the same feelings which come to a prisoner when he hears the key turn in the lock of his prison door, opening it for him. The fog disappears like magic before the wind, and as we stand on deck we hear a voice shout something which makes us all stare excitedly at a large ice-floe to starboard.

Polar bear !

Where ?

There, on the top of the floe !

Right enough, there before us, with the dispersing fog as a background, the bear stands like a yellow shadow. In less than a second we have got the seal-boat out on the water ; sportsmen and photographers all tumble in, in company with their guns and their oars, so that five men lie in a mixed heap at the bottom of the boat. It is not long before the oarsmen are in their places and bearing down towards the ice-floe, where the polar bear is sending foam flecks flying over its shoulder. It is a few hundred yards away—nearer and nearer we approach and see the bear more and more distinctly. It is three or four years old, and those of us who have never seen the

polar bear living in its natural surroundings are delighted to see it disporting itself on the floe. It has not yet noticed the boat approaching. Contented to play with the top of an ice-clump, it stands up on its hind legs, striking it with a fore paw, and sending the snow-flakes flying around it. Then it turns a somersault, lies on its back and waves its four legs in the air, jumps up and starts to play "Peek-a-boo" with itself round the ice-clump. We are close up to it . . . twenty metres, ten metres. . . . Still it does not see us, for it is lying behind the clump. We round it, and just when we are five metres away the bear hears the splash of the oars. It rises up on its hind legs, stands like a statue for a second, gazes at us doubtfully, then turns round and rushes away in a heavy gallop over the floe, sending the snow flying in all directions. From the other side of the floe we hear a splash ; it has jumped into the sea to try and save itself by swimming. . . .

The three oarsmen bend their backs ; we round the floe and see the bear swimming towards the *Hobby*. It is a thrilling moment ! Here are three strong men rowing until the boat trembles under their exertions : while the perspiration runs from them, the distance between boat and bear increases, and we believe for a moment that it will be able to get away, by reaching an ice-floe on the other side of the vessel. Should it manage to get there, it has a good chance of saving its skin. But the poor beast cannot keep up this great speed for long ; it swims more and more slowly, and catching sight of the *Hobby*, decides to change its course towards a smaller floe on to which it jumps, gallops over it and slips into the sea on the other side. Our boat gains on it now with every stroke of the oars, and we can hear its heavy breathing. A little later we are close up to the bear ; it lifts its head and gives a terrified glance at the boat, then turns

towards the *Hobby* and tries to cast itself underneath, while Berge stands filming on the deck. We are three metres from the vessel's side. The bear turns its tired, shiny eyes towards the boat, opens its large mouth and gives a hoarse roar. An oar is stretched toward it which it bites into splinters.

There is a shot. The bear is hit in the neck. A stream of blood welters out, colouring the water and the bear's own skin with crimson. The heavy body gives a mighty lurch and with its last ounce of strength attempts to dive, and we can see when it is in the water how it tries with its powerful claws to get deeper down, but its strength gives out, and turning on its back, it gives out a series of terrible roars. A shot in the chest and now it lies still beside the crimson-dyed water. We cut a hole in its neck and drag it across the ice-floe, where we proceed to skin it.

They watch us from the ship and, putting a boat out, row across to where we are skinning the bear—an operation which is being filmed and photographed. The *Hobby's* dog Sally accompanies them ; she is a mongrel resembling a fox terrier, and has the name of every canine breed included in her pedigree. The little animal snuffles round the bear, and is finally photographed, by her proud owner, sitting on its back. We take the bear-skin on board, also the gall bladder, the contents of which, according to Arctic traditions, constitute a cure for gout, when mixed with an equal quantity of brandy.

Safely on board again and we feel like new men. We forget that only an hour ago we cursed the Arctic seas and everything connected with them, whilst we only longed for sunshine and for warmth—for flowers and leafy trees, and for the songs of woodland birds on a summer evening. But now it is changed ; we are no longer merely passengers on board, we have become

Sally on the Bear

part of the actual life of the ice regions. We at last begin to understand how it is possible for people, year after year, to leave their summer homes and set off to journey amongst ice and snow-fields here in the north—not only is it a possibility, but a necessity—for this region possesses a power which draws back to it those who have once visited it. The fog has now vanished, and in the distance we can see Spitzbergen's coast quite clearly from Norskeöene in the west, to Verlegen Hook in the east. Northwards and eastwards the sea is almost free of ice, while a number of cracks break pieces off the unending ice-plains. We hear an order given to set the engines going, and we, who in the fever of the chase after the bear, have almost forgotten the reason we are here, are called back to a world of reality by the first thrum of the motor-engines.

The *Hobby* is soon steering towards the north-east, making for the most northerly of the Seven Islands. This afternoon the weather has got clearer, and soon after 7 p.m. we enter into the first belt of drift-ice. We understand more and more the charm of life in these high latitudes. The sea is blue, the sky is blue, and jolly little waves are washing over the small ice-floes, while each ripple (under the influence of a north-east breeze) is tipped with foam which glistens in the glorious sunshine, making all on board feel well pleased with the world at large. We pass one large iceberg after another, heavy, stranded icebergs, which stand 30, 40 or 50 metres above the surface of the sea. They are eight or nine times deeper than the part which we can see, and stand on the sea bottom, until such a time as sun and wind leave their mark on them to such an extent that they overbalance and drift off southwards. We ask if it is possible for the *Hobby* to sail close up to them so that we can get good photographs, but Captain Johansen says "No." He has

experience in this matter and knows that an iceberg, which at the moment is lying quite still, can suddenly topple, and although the *Hobby* is a very strong ship, she could hardly stand being struck by such a colossus. As we pass a heavy, flat ice-floe, we see an interesting sight. The waves are swaying it with a regular rhythm, and spouting up from its very centre there is a large column of water which rises 20 to 25 metres into the air. The explanation of this strange spring is simple enough. A caprice of Nature has formed a hole in the floe, and as the waves rock it, the water presses through the hole with such force that the floe becomes a floating fountain.

We never tire of standing on the deck watching the drift-ice, which has a charm for anyone who is observing it for the first time, even as it has for "old hands" in the northern regions. Against the sides of the great icebergs waves are breaking, just as they do against the island reefs of the Norwegian coast. The drifting pieces of ice have ever-changing forms. During a thaw, sea, sun, and wind turn them into shapes more weird and fantastic than even a sculptor could do. The *Hobby* passes every possible kind of fabulous animal; we see extraordinary buildings, and twisted, stiffened trees; profiles of dead and living people whom we recognize; Gothic and Grecian pillars; floating models in a variety sufficient for a complete generation of artists and sculptors. From the floating ice we can see dangerous projections which are often many yards below the sea's surface—projections which should they come in contact with a steamer's hull might be as fateful as striking a rock. While we pass through the belt of drift-ice we have a watchman continually on the look-out for these projections—with a wave of the hand he warns the man at the wheel each time it is necessary to change our course;

thus we do not follow a straight line, and if we drew a plan of the course we pursue it would resemble an arabesque.

We pass out of the belt of drift-ice and after a half-hour's duration are in a sea that is clear of ice. Looking back upon the belt we have just left, we notice that it appears like a white strip between sea and sky. Southwards through the hazy air we see Spitzbergen's cliffs, and westwards we can just glimpse the coast of Northeast-land and the ice which covers it. Straight ahead new masses of ice begin to appear on the horizon. Is it another belt of drift-ice, or is it the border of the polar ice ? We can only answer this question in an hour's time, and we shall then know how soon the *Hobby* can begin the first patrolling operations.

It was only drift-ice. We cross it in the same manner as we crossed the former belt, and continue north-eastwards till late evening. The unbelievable happens ! On the eastern horizon, one island after another appears ; and we have proof that in the *beginning* of June, the *Hobby* has managed without difficulty to break right through to the Seven Islands, which, in a year of bad ice conditions, can only be approached in the late summer, and in very bad years cannot be approached at all. Last year at St. Hans' time, it was hopeless to try and pass Mofföen. Thus the conditions change from year to year with a capriciousness, the factors of which, scientists are beginning to understand at last.

At midnight we are in 80° 45′ N. lat., 18° 15′ E. long. and we cease operations for the night, lying fifty yards from the border of the polar ice, which stretches northwards and eastwards as far as we can see through our binoculars.

The "Hobby," Sunday, June 7th.

Our awakening to-day was dramatic. Half asleep we lay for some time in our bunks, as we heard and felt bump after bump on the ship's hull, so that in spite of its strong timbers it trembled under the force. When we were wide awake, even the greatest landlubbers amongst us were aware that the bumping comes from the bottom and not from the sides, but before we had time to utter an opinion about the occurrence, we saw the skipper, who had been taking a well-earned sleep after his strenuous work, disappear from his cabin with his trousers in his hand. We stretched ourselves and turned over in our beds, for any help we could give would be worthless, and therefore we settled down for another little snooze.

The bumping continued and from the bridge we hear orders called in language which might have been couched in more parliamentary form. A noise like a storm issued from the engine-room ; they were trying at all costs to get the engines to work. We scrambled into our clothes and went up on deck, where we saw immediately the cause of the uproar, and the reason why the Captain was shouting out hoarse orders, while he still stood with his trousers in his hand. The *Hobby* was lying "far in," amongst the drift-ice, and it was necessary to get out of it as quickly as possible, otherwise we might stick there for a much longer period than we should care to do. We also saw at a glance the cause of the bumping. A tremendous block of ice which lay close to the *Hobby* had a long projection under water—of such large dimensions that it stretched right under the vessel, and was visible at the other side knocking against an ice-floe which was crushing in on the side of the boat. Every time the floe heaved it struck the projection and drove

it against the ship. The situation was not one of imminent danger, but it could become so at any moment, and we longed to hear the throbbing sound which would tell us the engines had started. . . .

At last our wish was gratified, and a start was made. Gently and carefully the *Hobby* glided over the "ice-projection," which, by way of a farewell greeting, as we got free of it, gave us a heavy double bump. We heaved a sigh of relief all round and the Captain at last had leisure to put on his trousers. We were not right out of our trouble, however, as we had still 200-300 metres of ice to get through before we reached a clear watercourse, but after a good deal of manœuvring we got through and steered eastwards. It seemed to us at first that the ice lay in a straight line to Ross Island (the most northerly of the Seven Islands), but after we patrolled its edge for an hour we found there was a large bay at the middle island, and from the deck we could already see that the boundary between the loose "screw-ice" and the solid ice continued eastward to North Cape in Northeastland. It appeared as though the solid ice lay in a curve starting from a point within the bay and stretching north-east from Seven Islands, where we then lay.

The engines stopped, and the *Hobby* "lay to." The sea was still and not even the smallest puff of wind ruffled its surface. We were far away from the great "ocean-highways" at a spot where neither the charts nor the northern seamen on board could give us much information. New charts had to be drawn according to photographs and descriptions, for *exact* measurements and observations can never be taken, nor can much reliance be placed in the existing charts, for good ones of this district are scarce. The seal-boats which sail these waters get through, guided by the wits of their skippers, who mostly possess the explorer's sense of direction.

The landscape is different in this part to that of the coast lying westward. There the hills are high and jagged, a condition which rightly caused the Dutchmen to call the island-group "Spitzbergen" (spitz=point; berge=hills) when they discovered it in 1596.

Here the hills are lower, more rounded—sloping evenly towards the sea and ending in long tongues of rock which stretch out from the coast. The Seven Islands have a formation which is characteristic of the whole district; they rise right up from the sea 200-300 metres high. One of them—the chart calls it Nelson Island—presents the appearance of the façade of l'Eglise de Notre Dame of Paris. We wished to call it Cathedral Island, but several people said the island had been called after Admiral Nelson, so we decided to let it keep its name.

We lay on the deck in the grateful warmth of the sun, while the Captain stood with his glasses ranging the entire landscape for a sight of the airmen. He has travelled the polar seas for 25 years; his father, uncles and grandfather have done the same before him, for he belongs to a race, found frequently in Northern Norway, which has wrested its living from the ice regions. The other evening as we sat in the cabin and studied the Arctic charts, we noticed a little spot called Lonely Island lying beyond the Taimur Peninsula in Siberia, and in parenthesis under its name stood the name "Johannessen 1878." It turned out to be the uncle of our Captain, Kristian Johannessen. He had sailed round Novoje Semlia before anyone else and had been with our skipper's father many times on the polar expeditions of the Swede Nordenskiold.

He has a history of Northern custom and tradition behind him, for his people have often left their work of trapping, if they believed that there was some geo-

graphical secret to be unravelled or some new road to be opened up. The Hammerfest skipper Elling Carlsen came into this neighbourhood, where we are now lying, with a little vessel in 1863 in order to follow his calling as a trapper. As the fairway northwards appeared to be free from ice, he did not turn back the way he had come. He steered eastwards, sailed round Northeastland, and set his course southwards towards Norway, passing Giles Land, Barents-oen and Hopen. For such enterprise (in days when ice-boats only had sails) he got a well-deserved reward from the Royal Geographical Society in London.

How much this skipper's experience has helped in our present expedition it would be difficult to say, but certain it is that many an explorer has been aided considerably by this man's discoveries and by his accounts of conditions in districts hitherto unexplored and unknown. Polar explorers have always worked in company with the trappers in the Arctic—and Nansen, Sverdrup and Amundsen all made their first expedition in a seal-boat. Can one not regard their enterprise as a continuation of the work done by brave skippers in earlier days who took advantage of every opportunity which offered ?

Nothing is to be seen of the airmen. On an ice-floe near the coast Johannessen notices that a number of seal are lying sleeping and sunning themselves. The seal-boat has been hanging on its derricks since the bear-hunt, so we quickly lower it and some of our party row towards the floe. They have to row very quietly (and have not gone far from the side of the vessel when we on board can no longer hear the sound of the rowlocks), for the slightest noise will waken the seals, which are light sleepers, and once awake they will flop into the sea and dive. Through our glasses we follow the progress of the boat. They crouch over their oars, and we

can see nothing but their heads over the side of the boat as with long steady strokes they approach the ice-floe. The seal lie in such a position that, if they are to be shot, the boat will have to round the floe. At last they are within shooting range, and the man with the gun rises noiselessly and takes aim. All the same the seal wakens, lifts its head and looks at him. It amazedly catches sight of the boat and we can see it draw itself together for a plunge into the sea. But it has been a good shot, and the fear that the animal would escape is groundless, for it remains lying on the outer edge of the floe with only its head lying in the water. The boat then draws alongside and the boys jump on to the ice, stick a hook into the heavy slippery skin and haul the animal into a more favourable position. The shot has struck it behind the ear, killing it instantly. In a few moments the big heavy body is skinned, several pounds of seal-flesh are cut off and all carried on board the boat. Then the men row on to where the next seal lies on a floe some hundred metres away. Hardly has the boat rowed off when the remains of the dead animal are being fought over by flocks of sea-gulls and sea-mews. They tear the remainder of the fat and flesh into pieces, swallowing one big lump after another, until there is not one morsel to be found. But, even then, they cannot leave the place, as they have become so heavy, it is impossible for them to fly.

An hour after, the boat returns with four seal-skins as their "bag," also provision for the larder :

"Fresh meat this evening, steward!"

Then the engines start again and the *Hobby* continues southwards along the coast. About 10 p.m. we "lay to" for the night, slightly to the north-east of Lav-oen outside Brandy Bay. The seal-boat rows out once more as the crew wish to make the little extra money

Enjoying the Sun

which a night's seal-hunting will bring them. From the deck we watch them row away between the ice-floes. We hope it will not turn out for these three men on board the little boat as it did for the three others who once landed east of Spitzbergen and went inland to search for eggs and eiderdown on the Tusind-oene. We heard of them from a seal-skipper whom we met in King's Bay. They took with them only a hook in a small lifeboat, and hardly had they landed when the drift-ice closed in between the island and the vessel, which lay some hundreds of metres away. The fog descended around them and everything disappeared in its density. The three men decided to wait. They waited eight days before the fog cleared. They turned the ship's boat over them to give them shelter from snow and wind while they lived on eggs and uncooked birds, for any available fuel was too wet to use. When the fog lifted the vessel had disappeared, and they had no other way to save themselves but to cross over the ice-floes in their little boat, towards the mainland-coast round South Cape, and nineteen days afterwards they arrived thin and emaciated, but otherwise in good condition, at the Swedish coal-fields in Bellsund. From there, they were able to get a coal-boat to Tromsö. Arriving home, they found that their vessel had not returned, however, as it had remained to search for Kristian and his companions, and when it arrived several days after their return it was flying its flag half-mast, causing Kristian, who stood on the quay, to burst out in loud laughter as he shouted, " Hullo, Father, what have you done with the top of the flag cord ? "

The weather is still calm, and the seal-boat does not row very far away from the vessel. One could not imagine a calmer night. The barren landscape is as still as death. The only noise that we can hear is an

occasional clang from the boat when an oar strikes the ice. The echo of it rolls from cliff to cliff along the coast. The sky is cloudless, but the atmosphere is hazy, so that the sun, which blazes high in the north, appears distant and unreal. The cliffs with their icy crests are reflected in the water. We hang over the side and gaze upon it all. It would be delightful if only we knew that the six airmen were safe. It is Riiser-Larsen's birthday. We remember a remark of his early in May: "Now we must *really* start, so that I can spend my birthday at home in Norway."

The "Hobby," Monday, June 8th.

There is not a great difference between night and day up here. When we went on deck in the morning the sun was shining from another part of the sky, otherwise everything was as before. The birds, after having taken two hours' rest at midnight, were also full of activity. Auks in dress-coats and white shirts are still in full flight and whiz in flocks upon flocks, from the land to the open sea, in order to catch food. Black guillemots and little auks fly madly away, their direction being determined by the higher air currents. Sea-gulls rest on their wings and keep moving round and round the boat, waiting for the steward to heave the contents of the rubbish bin overboard. They hover untiringly, hour after hour, though now and then one hears a beat of their wings when they have to change from one air-current to another. During the night a seal-boat has come along—it lies some hundred of metres away from us and we pass alongside of it. We row up to it and explain the *Hobby's* mission up here—the captain promises to keep a good look-out for our airmen and also to warn any other "sealers" he may possibly get into touch with. No

doubt there will be plenty of them up here as the conditions for making good catches are specially promising this year. (We can *already* see the mast-tops of another boat appearing on the horizon.) We also request the captain to warn those trappers, who spend the winter in the huts along the north coast if some of them by chance should visit him. He promises this, and as a farewell gift gets some packages of tobacco, because his supply is low, for his boat has been a long time at sea.

The *Hobby* moves off; the course is set northwards to the ice-edge; we shall steer past it westwards until we reach a point north of Norskeöene. The trip back to Virgo-havn on Danskeöen has started. After a few hours we near the ice-edge again, direct west of Ross-öen, and proceed along it; little by little Syvöene and Northeastland disappear in the horizon and we see no more land. Northwards is only ice and the edge stretches westward as far as we can see. We continue our course past it at a distance of 50-100 metres. A fresh breeze is blowing from the southward which produces white crests on the waves—it must have been blowing the whole of the previous day, because during the course of the day we notice that the belts of drift-ice, which we passed through on the way up, have disappeared. The wind has driven them northwards and pressed them into the edge of the pack-ice.

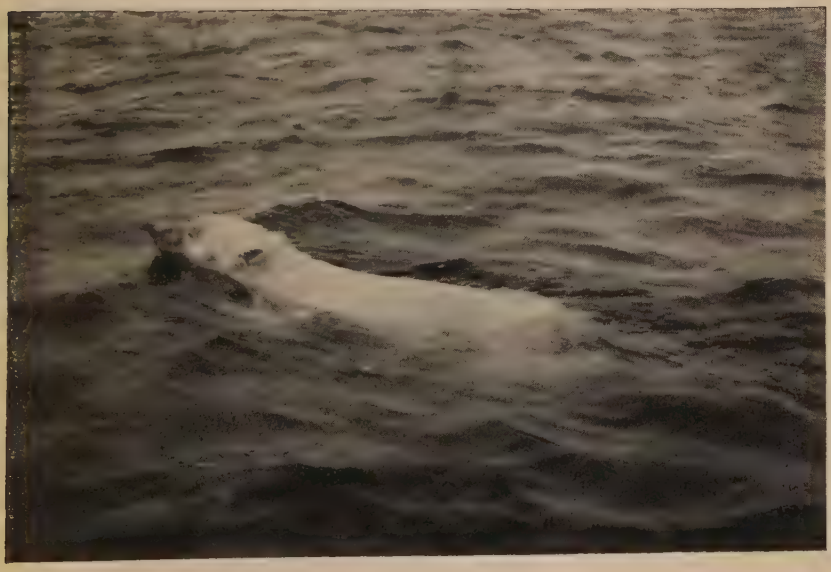
On the trip along the ice-edge we help the crew in "blubbering" the sealskins. During the work Wharton makes a strange discovery. The crew he is working with, had, during the war, served on the western front in the same American division to which he had belonged.

Having finished with the "blubbering" we see another polar bear. It is standing on a high ice shoal, at the extreme edge. We put a boat out and row towards it, climb ashore, and try to get within shooting

range. Slowly we approach from shoal to shoal. In the excitement we fire from too long a range ; the bullet passes the bear, which becomes alarmed and, looking like a yellow-white streak on the drift-ice, it jumps from one shoal to another and speedily disappears from sight. Shall we leave it in peace or shall we try to find it again ? We climb an iceberg and sight the bear through the glasses some hundred metres further ahead. One of the shots we fired after it when it sprang away must have injured it, for it appears to be lame on one side. It is not running any longer, but jogs along slowly over the ice. We follow it with glasses. Then it stops, and we see it lying down at the foot of a big iceberg about a kilometre from us. We speculate what to do. To proceed across the pack-ice is impossible. Most of the shoals lying at the outside are not sufficiently large to bear the weight of a man, and between the bigger pieces, there are either big cracks or wide openings filled with mush and small lumps of ice.

If we have to get hold of the bear we must pull the boat along with us, push it over the shoals and row where we can. We look at each other and come to a quick decision.—It will mean hard work !—One man goes forward with the boat-hook, which has to be hooked into the shoals so that the boat can be hauled along ; two men push with the oars, and two men jump now and again on to the shoals to help to push the boat over the mush. But they have to be nimble-footed, because many of the shoals they trust themselves on, are not big enough to carry them and sink immediately. Then it is a question of getting on board again before they get too wet. (Now and then they are *not* quick enough.) In such a manner we get slowly along. The bear is still lying at the same spot. At last, we get into gun-range and shoot. It jumps up, we shoot again, it col-

Icebound.



A Bear

lapses and we run towards it and fire a mortal shot. We skin it and take the skin with us to the boat, which we have left in a clearing between two shoals. Then we sit down to enjoy a few moments rest which is very necessary. It took us one and a half hours in the snow to cover one kilometre from the ice-edge to the bear, and we are wet through, partly from perspiration and partly from sea-water.

Then we press on again. The same toil on the return journey has to be gone through, and about three hours after having left the *Hobby* we are on board again. They have been a little anxious when they noticed how far we had ventured on to the ice, because a fog-bank was approaching from the south. We had not noticed it in the excitement of hunting the bear. Barely half an hour after we are safely on board, the fog gets so thick that we only proceed at half speed along the ice-edge, which we can just catch a glimpse of 50-60 metres away from the ship. We are exactly north of the "worst-weather-corner" in Svalbard: Hinlopen-Strait (between Spitzbergen and Northeastland), where there is always fog or wind at sea. The fog-belt we have got into is not very extensive. After an hour's steaming we are out of it; we get clear weather again, but the sky is still a little overcast. We continue full speed along the ice-edge.

Throughout the evening we discuss the result of the trip. The experts on board are unanimous in the opinion that if the airmen get to Svalbard, the only place where one could expect to find them would be Northeastland, and the greatest chance of picking them up, if they get near land, would be on the east side of Syvöene and Nordkap, where the distance from the solid ice to the land is shortest and where the belt of pack-ice is smallest. It is practically impossible that they, with

their primitive outfit and scanty remaining provisions, can manage to trek westwards to the ice-edge here, and if they *should* succeed their position would be infinitely more difficult than further east. How broad the belt of pack-ice in front of the solid ice may be, is, of course, a matter we cannot judge. But right away from Syvöene we can see it stretching as far as our glasses can range, namely, about 15 kilometres. The further westward one goes the broader the belt probably gets. Seeing we took one and a half hours to cover a bare kilometre when we chased the bear, although we had good assistance, in having the boat to help us and nothing to carry, it would take a much longer time for the airmen to force their way forward over a similar distance. They would have to carry a burdensome pack, and the small canvas boats are far too fragile to carry the heavy packages when being pulled through the ice. If notwithstanding all this, they manage to get westwards to the ice-edge, they will have to go along to Northeastland, because from the edge of the ice to the north coast of Spitzbergen, there is an open sea channel to a breadth of about 100 kilometres, and to try and row across this in canvas boats means certain death.

We are further agreed that, if flying-machines come northwards in order to take part in reconnoitring, they would be of most service if they chose Lavöen, on the west coast of Northeastland, as a basis for their operations. Therefrom, they can fly westwards and eastwards, as far over the ice as is considered justifiable.

VIRGO-HAVN, *Tuesday, June 9th.*

We proceed the whole night, steering along the ice-edge, which north of Mofföen bends southwards, and at 80° 14′ bends again westwards. During the night the

watchman on the bridge has seen four bears on the ice. Almost due north of Norskeöen, we left the ice-edge and set our course for the islands.

We lie a few hours in the Sound between the islands to collect eggs, and then continue down to Virgo-havn, where we arrive about half-past seven. The *Farm* is not here, but inside the hut—Pike's house—is a message from Captain Hagerup, also the following telegram dated Oslo, June 6th, from the Aero-Club :

"Decided last night establish safety polar-flyers following places Spitzbergen East Greenland West Greenland, Cape Columbia, stop, At Spitzbergen it is considered that the two vessels and two aeroplanes are sufficient but will warn Norwegian seal-hunting vessels search also east side Spitzbergen, East Greenland in all probability by French explorer Charcot with Ritmester Isachsen stop Approaching committee New York to take over work at Northeast Greenland and Cape Columbia."

In the message from Captain Hagerup of the *Farm* to First Lieutenant Horgen, he informed us that orders had arrived from the Commanding Admiral that the ship was to go to Advent Bay to coal, and meet the two flying-boats which were on the way northwards from Horten with a collier. The *Farm* had gone southwards last night, and if she had not returned to Virgo-havn by Tuesday, June 16th, at 8 a.m., the *Hobby* was to go down to King's Bay again. In the meantime the *Hobby* was to go northwards and eastwards on a new reconnoitring trip. As there was a possibility that the *Farm* might arrive before the *Hobby* returned from its other reconnoitring trip, we journalists were to go ashore at Danskeöen, and wait for four or five days in Pike's house until the *Hobby* or *Farm* should return.

DANSKEÖEN, *Wednesday, June 10th.*

We are living *here* now! The *Hobby* went north at 4 p.m. and we have established ourselves as well as possible in the little hut. During the few days we have been with the *Hobby* it has practically turned to summer here. Snow lies only on the high hillsides, and in occasional heavy layers here and there in the bottom of the valleys. Otherwise the fields are bare—to say "fields," by the way, is not to use the right expression, because the whole of Danskeöen is one complete heap of stones! In course of time, water and ice have burst the sides of the hills into pieces, and it is only the very steepest of the precipices which are not covered with loose stones. We hear the water trickling everywhere, deep down between the stones, which lie so loosely, that we have to be more than careful in climbing over them. To-day it has rained for the first time during our stay in Spitzbergen. It is nice and homely to sit in the hut and listen to the rain lashing against the glass window panes, and to watch it splashing on to the ground outside.

DANSKEÖEN, *Thursday, June 11th.*

During the night whilst we slept, we were aroused by a rustling outside. Wharton (who having met so many bears had the feeling that we might meet some here) wakened me with a hard dig in the ribs, shouting, "Load your gun. Polar bear outside." It was, however, only three hunters who had spent the winter on the east side of Spitzbergen in a little arm of Hinlopen-Strait, called Lommebukten, or Pocket Bay. They had rowed the long distance round the north coast in a little boat which was deeply laden with fox-skins, the remainder of their provisions, and all the outfit they had

used during the winter. The use of their boat afforded us a great deal of pleasure. We rowed about auk-shooting in the forenoon, and later we went out in it round the islets collecting fresh eggs.

There we were received by eider-duck and gulls, kittiwakes, sea-swallows and geese which flew up in thousands from the nests, chirping, whistling and shrieking as they in desperation swooped down over the heads of the robbers of their nests, flapping their wings about our eyes. We hit out at them with our caps, but did not allow ourselves to be frightened back to our boat again. Nest after nest has to be looked into—it is principally the nest of the eider-duck we care about. There are about five or six eggs in each and a handful of down. We are not actual robbers, for we leave one egg in each nest, and a little bit of down, so that the hen will continue to lay—she will come back and bustle about till the nest is all right again. (If we removed all the eggs and the down, the hen would desert the nest.) Egg and down collecting is not a pleasant occupation from the point of view of smell.

When we get to within about 10–15 metres from the nest, the male bird starts to cry "oi-oi-oi-oi-e," while the hen sits close over her eggs. She sits immovable, only a blink now and again of her black eyes betrays that she is watching us. (Will she manage to deceive us into believing that her nest is a moss-covered stone ?) But like all menfolk, the male bird is frightened at the bottom of his heart. We only take two or three steps towards the nest, when he rises up and sets noisily out towards the sea. The deserted hen follows. But at the last moment when she rises she makes one final frantic effort to save her eggs. Had we not been coarsened by our stay up here she might have succeeded in saving them, but as it is, we plunder the nest.

It has stopped raining. White clouds drive across the blue sky and it is warm in the sun. The air is fresh and mild ; to lie here now on the island is like being in the fields at home in Norway in the summer time.

DANSKEÖEN, *Friday, June 12th.*

We have plenty to do in the hut. Roasting, cooking, and making coffee the whole day, but we have plenty of time to look at the remains of André's and Wellmann's expedition equipment, which lies spread about in the valley where the hut stands. They are not just small things. The apparatus they used to make the gas for filling the balloon which is lost for ever, and the airship, which fell down immediately after the start, lie in a heap, rusted and weather-stained during the passage of time. Heaps of cases filled with filings, damaged acid-balloons, and heaps of timber from the collapsed balloon sheds lie spread about. On the lids of the packing cases, we can still read the half blurred addresses. In Wellmann's house the stonework is still standing practically untouched, and there is a kitchen range which looks much better than the old trumpery one we have in our hut. The other part of the house has disappeared—until some years ago it was still there, but then it was stolen (in the true sense of the word). An enterprising skipper who had bagged no seal that year, pulled it down and took all the timber on board, covering his expenses for the trip (and even more than that) by selling it all to one of the collieries.

The north-west corner of Spitzbergen, is, on the whole, one of the most classical parts in the history of Arctic expeditions. The first expedition which started from here for the North Pole was a British one. Two men-of-war passed here in 1773, but they did not get further north than 80° 36′ when the ice forced them south again.

On board one of these was Nelson as midshipman, and during this trip he was not far from being killed by a polar bear. In the following decades several attempts were made to get northwards from Spitzbergen, but all the experiences which these expeditions showed, was, that it was impossible to reach the great goal from this side by sailing-ship. The ice stretched too far down, and the current turned the boats southwards as soon as they had got well amongst the ice, so that manœuvring was difficult. For a long time no attempt was made—the next was André's and Wellmann's. It was left to Fridtjof Nansen to show the way to the North Pole, with the *Fram*. This last named boat, when it came out of the ice in 1896, passed Virgo-havn steering southwards to Norway. That summer André was on Danskeöen, waiting anxiously for a favourable wind to allow him to start his balloon trip, but it did not take place that year, and it was only in the following summer that he got away.

DANSKEÖEN, *Saturday, June 13th.*

Weather fine, calm and clear, with slightly blurred sky.

DANSKEÖEN, *Sunday, June 14th.*

Same as yesterday.

DANSKEÖEN, *Monday, June 15th.*

About four o'clock the *Hobby* returns from the second trip. It has had a spell of drizzly weather, has rolled a lot and has seen nothing of the airmen. Ice was about the same as on the first trip; north of Syvöene it had successfully forced its way right up to 81°. The *Farm* has not yet got back. If it is not here by 8 a.m. to-morrow the *Hobby* will go to King's Bay.

NY-AALESUND, KING'S BAY, *Tuesday, June 16th.*

The *Hobby* arrived here at 4 p.m., after a good trip along the coast past the seven glaciers. A fresh wind blew and now and then the vessel took a little water on deck. During our stay up north, great things have happened. There is a telegram for us from Advent Bay, telling us that two naval flying-boats have arrived with a collier from Horten. The *Farm,* which has to be taken over by a scientific expedition, has gone southwards to Norway, and the naval patrol-boat the *Heimdal* will be the flying-boats' mother-ship. We communicated immediately by wireless with the *Heimdal,* which had also arrived at Advent Bay. The flying-boats are on the water and can start whenever the weather conditions permit. We have put out buoys at places where they can moor, but we advise the *Heimdal* that it is blowing so hard here that the start must be delayed until the wind abates.

NY-AALESUND, *Wednesday, June 17th.*

When we wakened in the morning the weather was good for flying. The sky blue, clear and high, the fjord ruffled a little by a slight breeze from the east. First Lieutenant Horgen informed the airmen in Advent Bay that everything was all right for their reception here, and we received word that they had set off immediately on receipt of Horgen's message. That was at 9.35. A little after eleven o'clock we expected them, and we had hardly begun to look for them over the entrance to the fjord when we heard their engines in the distance. Soon afterwards we saw them appear like two small specks 1,200–1,500 metres up in the air over the flat tongue of land at Quade Hook. A few minutes after F.18, piloted by First Lieutenant Lutzow-Holm, and F.22,

piloted by First Lieutenant Styr, landed and moored by the buoys. We were naturally very pleased to see the boats and the airmen, but our pleasure was mixed with sadness. To-morrow, Thursday, 18th of June, it will be four weeks since N.24 and N.25 started. That day the weather was just as fine and ideal for flying as to-day.

In company with the newly-arrived airmen we got by the starting-place, which is quite free from snow. On the beach still lay some of the petrol cans from which we filled the tanks of the two machines the night before they started. We ask about the news from the South and then we tell them what has happened up here. It seems that the opinions at home are the same as up here —nobody thinks that the six will be able now to come *flying* back ; everyone is of the opinion that most likely the machines have got damaged through landing in the ice region and that the airmen are now on their way to Cape Columbia. But as there is a possibility that the six may be on the way to the north coast of Spitzbergen, it is thought that the expedition which has arrived here *must* be sent there to search for them.

The *Heimdal* arrived 8 p.m. to-day. Captain Hagerup is on board and is now to lead the expedition. He has not got special instructions how long the *Heimdal, Hobby*, and the two flying-boats shall patrol, but probably we shall still be here for two more weeks. On Thursday, 2nd July, " the six weeks from the start " are up—the time limit which Amundsen laid down in his instructions for patrolling the ice-edge. Plans for the coming fourteen days are being made, and in accordance with the experience which the *Hobby* has garnered on the two trips, it is agreed that Lavöen by the west coast of Northeastland is the best base for the two flying-boats to operate from, and it is settled that the two vessels shall go

northwards to Danskeöen at midnight. They will be there to-morrow 8-9 a.m., and the flyers are to follow.

The uniformed officers and the naval armaments remind us of a world from which we have been cut off for the last six weeks, and they have a much stranger and more unfamiliar effect on us than one might have expected in such a short time. We have had a taste of both winter and spring up here, and now we are experiencing the short summer of the Arctic regions. Our thoughts go back to the start—to the long weeks preceding it in Ny-Aalesund, and to the still longer weeks we have spent in the ice area since the six departed. We have seen men, whom we (until they disappeared outside the fjord in two grey flying-machines) considered as ordinary mortals, but who are now regarded by us as something apart, since the light of adventure started to shine over them. Shall we see them again? We put the matter out of our minds, but the thought returns to us again and again. It is even stronger to-day than it has been recently, because the *Heimdal* and the flying-boats are lying here—actual proof that the world at large is possessed by the same doubts and the same fears as we are.

We also think about all the types of humanity we have met in this frozen northern area. People who wrest their living from the ice. In milder climes they could earn more and live under better conditions, but the "unknown," the danger, the ice and the love of adventure all call to them just as they called the six. With modest outfits and simple means they answered the call and set off to the sound of the enthusiastic jubilation of mankind: a jubilation that has turned into doubt and fear. But now an expedition fitted out with all the aid that science can offer is to look for the explorers, or at least to try and find trace of them.

We have dined with the newly-arrived flying-men and the officers of the *Heimdal* at Director Knutsen's to-day. We were in the same room where we had been so often with those six, and where only two or three weeks ago we had said good-bye to those comrades of ours who had first travelled south. Our host, who at that time had been very optimistic, tries to buoy us up with hope. But we notice that he himself is no longer confident, doubt has entered into his optimism. It has taken longer to come to him than to the rest of us, but it has come in spite of himself, all the same. Conversation drags. Here we sit—more than fifteen men—all different in mind and character, and all following different occupations, and we are trying to find a theme that will interest us all. But there are long intervals, because our thoughts are all on the one subject, which we do not want to mention. One after another goes down to the ships which will soon carry us north again, where we are to wait for the end of the fourteen days when we can return to Norway. That will be a sign to the waiting world that all hope of finding the six in these regions has been given up. (Spitzbergen will then glide away out of our consciousness.)

NY-AALESUND, KING'S BAY, *Thursday, June 18th.*

The last guests left Director Knutsen's at 1 a.m. and went on board. The *Heimdal* was under steam and ready to start. In a few minutes the third and last period of the reconnoitring was to begin. We approach the quay and can see the tops of the masts over the crown of a little hill. People from the mining village, who are not used to any great excitement, stand *en masse* on the high loading-pier. We are right down below them and only 40 to 50 metres away from them. Then the great

thing happens !—A man comes tearing along the loading-pier towards the shore. He waves his hands to us, bends over the side of the railings and shouts : " Amundsen has arrived." Then he dashes on and his voice is hoarse and rough. " Only a drunken man can make such a bad joke," we say to each other, and continue on our way for another four or five steps.

What can be taking place ?

People on the pier are waving their hats. We hear hurrahs and shouts and see a new vessel lying alongside the quay. We know immediately that they have come. We dash along the short distance so that the mud splashes over us, whilst the cheers from down below increase. We spring on board the *Heimdal*, which lies nearest the quay, then on to the *Hobby*, which is lying outside.

Lord ! it is true !

From the *Hobby's* rail we look down upon the deck of a small sealer, which lies alongside. There they are, all six !—Amundsen, Dietrichson, Ellsworth, Feucht, Omdal, Riiser-Larsen, dirty and grimy, but living and safe and sound, surrounded by workers and seamen, a motley crowd who shout hurrah, clap their hands and carry them shoulder high. We jump down on to the overfilled deck, we cry and we laugh, we pat their cheeks, we embrace them and words fail us. Not a sensible word could be spoken. Surely it can't be true ! We must be dreaming ! Is it really they ?

We reflect about matters a little, and then Director Knutsen takes them up to his house. The rooms are filled both by invited and uninvited guests who suddenly begin to sing " Ja vi elsker." Little by little we get to know what has happened to them. We don't learn much to begin with.

We learn enough, however, to understand why they

seem to have two different mentalities. A present one which sees and understands all that happens around about them, and a past which is part of their life in the north, and which will not leave them for a long time to come. They get food, a hot bath and a bed with fresh white sheets. In the course of the day their long four-weeks-old whiskers disappear.

The people who were at the quay when the motor-boat *Sjöliv* arrived, tell us about the unbelievable moment when they realized who it was who stood on the vessel's deck. When it had become known in Ny-Aalesund that the *Heimdal* and *Hobby* were to go northwards to Danskeöen at midnight, many people collected in the twilight on the quay in order to watch the departure. The midnight sun, which stood high in the sky over the hills on the other side of the fjord, shone through a light cloud-bank. At the mouth of the fjord was a little cloud-belt, and the people noticed how a little seal-boat came in through the evening haze. Nobody took special notice of it or showed special delight, as they all thought it was one of the many vessels which, in the course of the summer, call in at Ny-Aalesund to get coal and water. People watched indifferently, remarking only that it seemed to carry an unusually big crew for such a small vessel. Forward stand some heavily fur-clad men, who wave their arms towards the land. The vessel approaches quickly. Then somebody shouts: "It's Amundsen!" At the same moment everybody knows it. Cheers are given. The six on the foredeck wave shorewards and the vessel berths alongside the *Hobby*. All six are with us, safe and sound. A few minutes later the quay is black with people. One would have thought that the inhabitants of Ny-Aalesund had slept with their clothes on, for in a second the *Sjöliv's* deck is filled with people who go mad with joy.

Oslo, *July 1st.*

This morning I arrived home. I now read through my diary of the trip, and realize little of the whole. All that happened during the first hours on the deck of that little polar seal-boat is like a fog in my mind? The whole seems so far away. If I shut my eyes and try to charm those fourteen days back I feel bewildered in mind and in spirit.

For now we all stood there beside them—beside the six.

We looked into their faces, which bore signs of all they had suffered and gone through, and then we asked them to tell us about the four weeks of hope and doubt.

All power of thought seemed to leave us, and our souls were filled with feelings both boundless and indescribable. Could this be on account of the pleasure of seeing our comrades again?

Or have our souls been touched by the Unknown Being to Whom all turn in moments of trouble, when things have to be settled which are beyond human power?

Fredrik Ramm.

PART V

METEOROLOGICAL ACCOUNT

PART V

METEOROLOGICAL ACCOUNT

THIS part does not contain any scientific accounts of the meteorological observations undertaken by the expedition—in King's Bay, during the flight, or during the 24 days' stay in 87° 43′—this will be left for the scientific journals to publish. I shall only give here a characterization of the "polar-weather" as it was during 1925 and what was done in order to determine the best date for the start.

What kind of weather conditions must the flyers have for their journey towards the Pole ?

First of all there must be no fog at the place where they have to land. Even if there is only a fog-belt extending a few metres above the ground, a landing is impossible, and a "forced-landing" would almost certainly end in a catastrophe.

Further, the flyers must avoid passing through thick snow. The two flying-machines might easily lose sight of each other, and if, in order to keep in contact with each other, they should fly close together, there is always the danger of a collision.

An overcast sky without rainfall is also useless. At least, it must clear now and again, sufficiently to make it possible to navigate by the sun. It is, of course, known that steering by the magnetic compass is very uncertain so far north, as the extent of the deviations in the Arctic is not sufficiently known.

Luckily that much is known about the weather in the polar ice region that it is possible to choose in advance the most suitable time of year for a polar flight. First of all, Nansen's expedition by the *Fram* in 1893-1896 has given us this knowledge about the polar weather. During almost the entire time of their drift across the Arctic, observations were made nearly every two hours in the course of the day, so that a singularly rich stock of material exists. The observations have been thoroughly gone through by the late Professor H. Mohn, so that we have got them set out now in a most perspicuous form. Both the observers' and Professor Mohn's calculations are published in the work "The Norwegian North Polar Expedition XVII. Meteorology."

I am going to cite some figures from this book which give a clear reply to the question: Which time of the year is the best for flying to the Pole?

In the three years which the drift lasted the approximate number of clear days per month were:

In January	14	In July.....	0
„ February.....	12	„ August	0
„ March	9	„ September ..	0
„ April	8	„ October	4
„ May	7	„ November....	11
„ June	0	„ December ...	15

Thus in mid-winter (December and January), nearly half of each month is composed of clear days, but the number quickly declines towards the summer and there are none in the four months from June to September. It happens, of course, that in the summer time, the sun breaks through the sky at some time of the day, but even *that* is not very often. June had on an average 26 overcast days, July 27, August 24, and September 27 days.

As might be expected, downpours are much more frequent in the grey summer months, than in the other part of the year. The number of days with rainfall were, on an average, as follows:

In January	11	In July	21
„ February ...	11	„ August	19
„ March	13	„ September ..	22
„ April	13	„ October	14
„ May	20	„ November....	9
„ June	20	„ December ...	9

Therefore one can count that two-thirds of all the days from May to September have rain or snow-falls. In the winter time, on the other hand, only one-third of the days have downpours.

Fog—the flyers' worst enemy—also collects during the summer half of the year. Foggy days on an average were:

In January	0	In July	20
„ February ...	0	„ August	16
„ March	2	„ September ..	10
„ April	1	„ October	4
„ May	2	„ November....	1
„ June	10	„ December ...	0

One is therefore pretty safe to be without fog until May, but from June to September it is general. First in October the fog begins to get less and then disappears altogether in the middle of winter.

It appears quite clearly from the *Fram* observations, that only the dark period of the year has somewhat stable weather conditions, with a clear sky. During the light period of the year the weather is grey and thick.

These conditions are as unfavourable as possible for all flying expeditions towards the Pole. The good weather during the winter—October to March—cannot be taken advantage of on account of the darkness, and it is necessary to be satisfied with the much more unfavourable weather during the lighter period of the year.

Luckily, there is, however, an intermediate condition of weather, when the light is still there, but the summer's grey weather has not yet set in properly. April with its 8 clear weather days, 17 days without downpours, and only 1 foggy day, ought to offer the best conditions for flying. Only, one has to remember, that when flying over a longer distance, the chances of getting into ugly weather are much greater, than one would imagine from the impression given by the figures. In a distance of an extent equalling that from Spitzbergen to the Pole, during a good month such as April, one will in most cases have to pass through a bad and good weather-zone. In April, too, one has to reckon with severe cold. The *Fram* had a temperature as low as −38.04° C. in the month of April, and even at the end of that month it can go down to −29° C. If it is, therefore, one's intention to fly on a day of good weather, it is necessary to be well protected against the severe cold.

In 1925 the polar flight could not be undertaken as early as April. Notwithstanding the fact that the journey from Norway was undertaken before the real opening of the shipping season, and that the preparations in King's Bay proceeded quickly and according to programme, our machines were not ready to start until the beginning of May. An earlier start might well have been possible if the previous winter had been spent in Spitzbergen.

It was the business of the meteorologists to determine which was the best day in the month of May for the

start. With the *Fram's* experiences before us the prospects of finding a good starting day were not very rosy. In May, 1896, when the *Fram* was about half-way between Spitzbergen and the Pole, there were 25 days with rainfall, and only 3 days at the beginning of the month had clear weather. Should May, 1925, turn out just as bad as May, 1896, the polar flight would take place under very risky meteorological conditions.

What resources were now at our disposal to determine what kind of weather was expected ? First, the telegrams from the stations in the neighbourhood, indicating the kind of weather which was approaching. This system is commonly used by all meteorological institutions which have something to do with weather reports, and it was therefore only natural that this should be made use of for the polar flight. One can, however, know beforehand, that to make weather forecasts at Spitzbergen is much more difficult than at other places where it has been tried before. For instance, Southern Europe is covered by a network of telegraph stations which can report the approaching weather. But in Spitzbergen it is not so easy. The network of European stations certainly give reports of every condition approaching from the south, but no telegraphic weather reports can be got from the west, north or east. There are, therefore, many situations where the meteorologists, notwithstanding all the aid, can give no reply to the question : " What will the weather be like to-morrow ? "

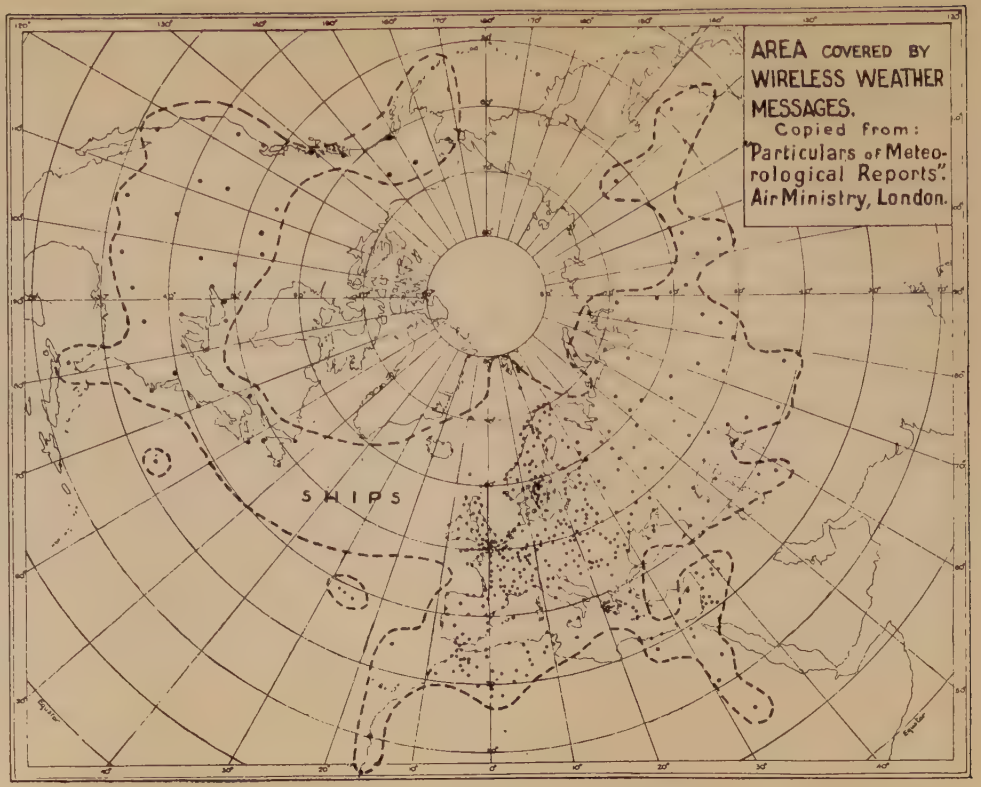
And that is the case in Spitzbergen. But the polar flight had to be undertaken from there, and had to extend more than 1,000 kilometres above unknown regions in unknown weather conditions ! How could anyone guarantee good weather for the whole distance ?

I know that many meteorologists would reply to such a question that this is beyond science. To prophesy

what the weather will be like near the Pole is pure guesswork. As now and again stress has been put upon this view in the Press, may I be permitted to defend the foolhardiness I showed by venturing to tackle this problem. I admit that it is very often quite impossible to say what the weather will be like on the way from Spitzbergen to the Pole, and still less possible to predict how it is likely to turn out in a day or two's time. But meteorology allows us to determine by indirect conclusions whether the prospects of good weather are bright or whether the situation is too risky. That these weather forecasts are based on very weak foundations, and therefore can easily turn out wrong, was known by the airmen from the first hour. Still, they preferred to follow the advice science could give, even if it was often vaguely formulated and given with all sorts of provisos.

The plan was, not to risk a flight in any case through fog and thick snow, where the aeroplanes would certainly lose sight of each other, but to turn back if the weather should begin to look too threatening. It would then be the meteorologists' problem to find another occasion, when it would be again worth while to try, and see whether in a renewed attempt the way to the Pole would be clear.

For several years now, the exchange of meteorological weather reports had been broadcasted by wireless, so that everybody who had a receiving apparatus could make free use of same. The *Farm's* receiving apparatus was of the latest type, and worked very well, even receiving meteorological messages from countries very far distant. Mr. Devold attended to the receiving of nearly all the weather reports—a job he was well acquainted with, through his position as assistant at the Geophysical Institute at Tromsö. It can safely be said that we could


AREA COVERED BY WIRELESS WEATHER MESSAGES.
Copied from: "Particulars of Meteorological Reports". Air Ministry, London.
SHIPS

Map of the Meteorological Stations.

not have got a better man for the handling of all the radio weather news which came to hand. He was untiring in trying to pick up and read communications which were very weak, coming from far distant stations, and it was thanks to him that the weather forecasting station at King's Bay was able to work with nearly the same full range of meteorological observations as any southern weather forecasting station.

The meteorological dispatches are broadcasted by international agreement, and, with one single apparatus, one can receive accounts of observations from the whole of Europe, North America and North Asia. That has been made possible by the various countries all having come to an agreement, in which they have arranged to send dispatches following each other closely according to a prearranged time-table. On the *Farm* we regularly received the following dispatches :

Observations from 8 o'clock in the morning :—

4.30	a.m.	Stavanger (repetition of Annapolis, U.S.A.)
7. 0	,,	London (English observations at 2 a.m.)
8.12	,,	Tromsö (by polar station Jan Mayen, Björnöya)
8.20	,,	Königswusterhausen (Germany)
8.25	,,	Haapsalu (Estland)
8.35	,,	Lyngby (Denmark)
8.40	,,	Karlsborg (Sweden)
8.50	,,	Oslo (Norway)
9. 0	,,	London (England and Faroe Islands)
9.15	,,	Grudziadz (Poland)
9.20	,,	Paris (France, Switzerland, Belgium, Holland)
9.30	,,	Sandhamn (Finland)

9.35 a.m. Budapest (Hungary)
9.40 ,, London (ships' observations)
9.50 ,, London (collected messages)
10. 0 ,, Tromsö ,, ,,
10.15 ,, Dietskoje Selo (Russia)
10.30 ,, Vardo (North Russia)
10.40 ,, Paris (collected messages)
11.45 ,, Oslo (Norwegian observations, 11 o'clock)
11.50 ,, London (English observations, 11 o'clock)
12. 0 noon Dietskoje Selo (Russia and Siberia)

Observations from 2 o'clock afternoon :—

2.12 p.m. Tromsö (by polar station Jan Mayen, Björnöya)
2.20 ,, Königswusterhausen (Germany)
2.35 ,, Lyngby (Denmark)
2.40 ,, Karlsborg (Sweden)
2.50 ,, Oslo (Norway)
3. 0 ,, London (England and Faroe Islands)
3.15 ,, Grudziadz (Poland)
3.20 ,, Paris (France, Switzerland, Belgium, Holland)
3.30 ,, Sandhamn (Finland)
3.50 ,, London (collected messages)
4. 0 ,, Tromsö ,, ,,
5. 0 ,, Paris ,, ,,
5.45 ,, Oslo (Norwegian observations, 5 o'clock)
5.50 ,, London (English observations, 5 o'clock)
6.30 ,, Stavanger (repetition of Annapolis, U.S.A.)

Observations from 7 o'clock :—

7.12 p.m. Tromsö (by polar station Jan Mayen, Björnöya)

7.20 p.m. Königswusterhausen (Germany)
7.35 ,, Lyngby (Denmark)
7.40 ,, Karlsborg (Sweden)
7.50 ,, Oslo (Norway)
8. 0 ,, London (England and Faroe Islands)
8.15 ,, Grudziadz (Poland)
8.20 ,, Paris (France, Switzerland, Belgium, Holland)
8.30 ,, Sandhamn (Finland)
8.40 ,, London (ships' observations)
8.50 ,, Tromsö (collected messages)
9.15 ,, Haapsalu (Estland)
10. 0 ,, Paris (collected messages)

As will be observed, Mr. Devold had a lengthy time-table each day—Sunday as well as week-day. The dispatches which arrived during the night and the early morning were received by the ship's own operators, who, besides, had, as part of their duty, to attend to the expedition's very large Press correspondence, when not attending to the meteorological telegrams.

Nearly all the north, west and middle European States are represented in the list. Observations from those countries, the dispatch stations of which one could not hear direct (for instance, certain south and east European), were received indirectly through the "collected messages" from London and Paris, which give extracts of all the observations from the whole of Europe.

Special mention should be given to the dispatches which were sent out specially for the expedition. First come the extra observations which the U.S.A. started broadcasting from Alaska, Canada, and the United States. These formed a very important addition to the general meteorological observations which America usually sent out for European use. It was especially important for

us to get the complete observations from Alaska—the nearest inhabited land—on the other side of the Pole. The whole of this extensive observation material was supplied gratis by the United States of America Weather Bureau, and telegraphed free of charge by the U.S.A. Naval Station, Annapolis. It gives me great pleasure to mention the tremendous assistance which the United States gave us in this connection, and I herewith offer them the expedition's grateful thanks.

Dispatches from Annapolis were received by the Stavanger station, which repeated them to the *Farm*. This was also done free of charge. The Norwegian telegraph authorities also showed their goodwill to the expedition, by instructing Vardeo Radio Station to receive dispatches from North Russian and North Siberian Stations and repeat same to the *Farm*, which hardly could have got them direct. I must also mention the help the Radio Station in Green Harbour gave us by assisting in receiving messages and forecasts during the critical days just before the start.

The Geophysical Institute at Tromsö, which is the central station for the weather-forecastings for North Norway, sent from its Radio Station, three times daily, the Norwegian observation material.

The Institute in Tromsö also deserves thanks for all the assistance it has given to the expedition, by sending out weather forecasts from the moment the trip was planned, and whilst we made our preparations in the winter, 1924-5. It was a great help to be able to sometimes consult their nearest meteorological neighbours in the south, who had many years' experience in the Arctic Sea's meteorological readings. I will specially mention a telegram we received from Director Krogness, a few days before the start, which informed us that his analysis suggested that a period of *stable* weather conditions was

now approaching. This was of great assistance when the starting day had to be fixed.

When the whole apparatus was in working order, we could receive meteorological dispatches from nearly all the stations marked on the chart Fig. 1. The network of stations is closest in Europe, so close that we often saved work by making a choice of stations. Asia and America have not such a close net, but even here it is possible to draw a weather chart which is largely correct.

Furthermore, in the English, French and Norwegian dispatches, there were a certain number of observations from ships in the Atlantic, which in themselves formed a bridge between the American and European stations. The whole station system, therefore, formed an almost complete circle round the polar regions, with the exception of North-East Siberia, where telegraphic communications are still bad, and this of course makes a wide gap.

The point now was (with the assistance of this net of stations round the Arctic regions), to control an account of conditions moving inside the polar area, and thereby draw conclusions as to what the weather might be like along the flight route. With this in view, the weather chart for the whole region was drawn twice a day. Besides this, two charts were prepared daily, showing the reports of the European net of stations, so that the weather conditions were being calculated every six hours.

The drawing up of the weather charts took place in one of the *Farm's* afterholds, which (with this end in view) had been prepared as a "weather forecast salon." There was not over much room for all the charts, instruments and other apparatus which had to be kept there, especially as the hold also served the purpose of an office for Dr. Matheson, the expedition's doctor. But with goodwill from both sides, it worked smoothly the whole

time, combining the weather forecasting with the doctor's practice, in the same room.

After the weather forecasting was properly established, I often had the pleasure of receiving visits from the members of the expedition, who were housed on land. During the quiet periods when nothing special was being accomplished, our two journalists were frequent visitors. In lieu of something better to do, they wrote about the weather, simply because it is always possible to say something regarding this subject. As the time for starting approached, Captain Amundsen and the other polar flyers often visited me, in order to see what the prospects were. During the times that the *Farm* was not lying in safe harbourage, Captain Hagerup was constantly in communication with the weather-forecasting station in order to ascertain in good time whether wind was approaching which might drive the drift-ice towards us. On the whole, I could not complain about the amount of faith that was placed in the weather forecasts, but it was often necessary to reduce this trust by reminding everyone how little we really knew.

All the outside observations were made by the meteorologist, Calwagen, Manager of the Meteorological Observatory in Bergen. His duties were so numerous that they deserve a whole chapter in this report, but as it has so far been impossible to make any preparation of the observations, Mr. Calwagen's calculations must be reserved for later publication in scientific journals. With Mr. Calwagen's permission, I shall only mention here that part of his activity which was of direct use in the weather forecasts.

In order that nothing which happened concerning the weather conditions should pass us unnoticed, Mr. Calwagen made observations as far as possible each hour of the day, continuing until late at night. These observa-

tions included wind, sky, cloud movements, cloud structure, cloud altitude, rainfall, atmospheric visibility, atmospheric temperature and dampness, the readings of the barometer, etc. Further we had brought with us a case of self-registering instruments for measuring the atmospheric temperature and the dampness. Inside were two barographs—one in the ship's instruments compartment, and one in the weather forecast compartment, which both gave information about the changes in the air pressure.

As often as we got rid of the low clouds, Mr. Calwagen sent up the pilot balloons for observing the wind's direction and strength. These observations were of the greatest value for the judging of the weather conditions, and I will therefore mention them in a few words here. The observations took place as follows: A coloured rubber balloon is filled with water gas, until it is a $\frac{1}{2}$ metre in diameter. One weighs its buoyancy and thereby knows the speed with which it will rise into the air. After the balloon has been sent up, it is observed through glasses which have graduated scales for calculating necessary horizontal and vertical adjustments—this is called a theodolite. The theodolite's indications are read and noted each half minute whilst the balloon rises. Afterwards it is possible to reconstruct the course which the balloon has followed, and to ascertain hereby the course of the wind at the different heights.

It was not always easy to find a suitable place to set up the theodolite. On board the *Farm* it very often happened that the balloon, after some minutes, got behind the ship's masts or funnel, and thereby was lost from view. On the ice in the fjord it was generally possible to find a good spot, with the exception of the days when there was a heavy swell on the water outside, which also set the fjord ice making slight undulating

movements, and which were disturbing enough when it was a question of reading one-tenth of a degree on the theodolite. Near Danskeöen, where there was no useful fjord ice, Mr. Calwagen had to be rowed ashore for each pilot observation, in order to have firm ground below the theodolite. Generally he chose the little islet Likholmen, where he could sit and have an uninterrupted view on all sides. When the *Farm* went out to get fresh water-ice from an iceberg which had got aground, Mr. Calwagen was there immediately, and got his apparatus put on the iceberg. This is probably the first time that pilot balloon observations have been made from an iceberg.

With the execution of all these pilot balloon observations, under conditions which were continually changing and often difficult, Mr. Calwagen had to use all his care and all his skill. It can certainly be said that he made use of every possibility imaginable, in order to collect data which might be helpful in supplementing the expedition's weather forecasts.*

When it was necessary to have two men for the pilot balloon ascents, Mr. Calwagen got excellent assistance from ice-pilot Ness, who, according to what he himself said, was only too glad to be employed a little

* After having sent in this report, the sad news had just been received that Mr. Calwagen has been killed in a flying accident at Kjeller, near Oslo, on the 10th of August, 1925. Immediately after arriving home from Spitzbergen he commenced to work on that branch which he was the first to start in Norway, namely, the reading of the atmospheric conditions by self-registering instruments installed in aeroplanes. In the course of the last year he has personally taken part in many flights, in order to complete the registering-dials of the instruments from his own observations. The accident happened during such a flight, just when he was engaged in collecting observations for determining the atmospheric belts.

All who were with the expedition will no doubt remember Mr. Calwagen as a practical man, helpful, impulsive, bubbling over with merriment, capable but at the same time possessed of a modesty, which was the natural result of his noble altruistic nature. We all feel very grieved at such a man's death.

Inflating Pilot Balloons for Testing Wind Currents.

on such an occupation during the long hours in which the *Farm* lay idle, not giving him enough to do.

Altogether 62 pilot balloons were sent up between the 15th of April and the 29th of May. It was possible to follow one of them through glasses, to a height of 10,500 metres. This, however, was only possible, because there was very little wind all the way up. Generally the wind was so strong that the balloon was lost sight of at a much lower height.

It will lead us too far into scientific spheres to describe all the methods used in determining the weather conditions from weather-charts and from observations which were made. I shall have to content myself by just mentioning the main principles which must be taken into consideration, when choosing the starting day.

It is the general experience that the regions which have low air pressure mostly have cloudy weather and rainfall, whilst places with high air pressure have fine weather with a clear sky. The point was, therefore, to avoid conditions where a depression was moving towards the Pole.

In order to be pretty safe from bad weather it was necessary to choose a high pressure condition. Further, the high pressure would have to lie north of Spitzbergen, so that the aeroplanes should not fly out of good weather directly into bad, on the way north. A high pressure condition over the Pole would necessarily bring with it north-easterly winds and cold weather in Spitzbergen. This north-easterly wind would (at West Spitzbergen) be an off-shore wind, and therefore would signify clear weather. Along the north coast of Spitzbergen the weather would be more doubtful, with a north-east wind which would cause the air to rise up against the hills and form clouds. But these cloud-masses on the north coast would very often only stretch out over

a limited area which the flyers could pass in a short time, preferably by flying over the clouds.

One has the best guarantee for stable weather conditions, when the pilot balloons show that north-east winds are not only to be found on the ground but also higher up. One knows then that the high pressure condition around the Pole will reach high up in the atmosphere, and is not just a low formation which could be swept away by the first attack of a storm centre from elsewhere.

The first high pressure condition in May occurred on the 4th, just when the aeroplanes were finished mounting. On the chart, Fig 2, one can see the high pressure region lying over the polar sea with a circle of low pressure round it, with the most important storm centres over Iceland, North Norway, three in North Siberia and one over Arctic Canada. This favourable condition did not last long. The low pressure over North Norway increased and passed north-east (along the dotted line on the chart) by pushing the polar high pressure aside towards Greenland. Before the final preparations were finished on the 8th of May, the low pressure had got so near the Pole that it was not advisable to start (see Fig. 3).

A period of drizzly weather followed now, when it was impossible to do anything else but wait. The wind was mostly between west and south, the sky was overcast, and we often had snow showers. Only now and again it cleared for half a day, but never long enough that there could be a question of starting. This state of affairs lasted until the 18th of May, when a change took place. A heavy storm centre, which passed Björnöya (see Fig. 3), turned the wind easterly at Spitzbergen, and behind the bad weather a high pressure region appeared which moved from Labrador via Green-

land towards the Pole. The wind was still too strong, and it was not quite clear at Spitzbergen, but there were good prospects that the next few days would bring good weather conditions for the flight. The planes were, therefore, got ready to start at short notice.

We had still to wait three days before the weather was as it ought to be (see Fig. 5). The high pressure region had spread itself long ago over the Arctic Sea, and the bad weather which passed Björnöya had moved to North Siberia, but right up to the morning of the 21st we had dull weather, with snow now and again, in King's Bay. The reason was a slight local depression which had remained persistently over the warm current which the Gulf Stream sends along the west coast of Spitzbergen. On the 21st there was, for the first time, sufficient easterly wind to drive the snowy weather out to sea, so that from midday on we had radiant sunshine and a cloudless sky.

At last the condition had arrived for which we had waited so long, the first useful condition since the planes had been ready to start. It *had* to be used, especially as the season was getting on towards the end of May, and the danger of fog was increasing each day.

So far we had not seen any fog at Spitzbergen, and if one had not had the knowledge about polar fogs which the *Fram's* observations (1893-6) had given us, it would have been tempting enough to wait longer. It was still pretty cold $-9°$ C. in King's Bay on the 21st of May, and at the Pole one might risk calculating that the temperature would be down to $-15°$ C. Both for the planes and the crews it would have been better and more comfortable to have had a more summery temperature. But of two evils choose the lesser. As soon as the summer arrives in North Europe, North Siberia, Alaska and North Canada, fog starts to reign over the polar sea. Each

air current above the Arctic, no matter from which direction it comes, will bring with it warm air, which will be exposed to a lowering of the temperature on contact with the polar ice. This cooling of the warm air, which contains a great deal of dampness, causes fog. This formation takes place quite independently, regardless of whether there is high or low pressure. Even the best high pressure condition in the summer might, therefore, be useless for flying. During the high pressure one will certainly be free from the clouds which produce snow and rain, and the flight can take place in radiant sunshine, but fog, even if it only reaches 20 metres up from the ground, will make a landing impossible.

Fog of that kind was very unlikely on the 21st, in fact one might say the possibility of its existing was quite excluded. The north-east wind on that day was so cold (−9° C.), that it must have come from the very central regions of the polar ice, and it is hardly probable that on its way to Spitzbergen it should have been exposed to the further lowering of temperature, which would have been necessary to produce fog.

All these observations lead to the following result: "Conditions to-day are as favourable as can be expected so late in the summer." It was not without nervousness that I advised the airmen of this result on the morning of the 21st—never have I given a weather forecast with such a heavy sense of responsibility. It was almost weighing me down with its fateful importance, but on the other hand it was so bracing to note how the airmen arrived at their *much more responsible* decision: "We start to-day."

And it was so! The last reports which were received at midday did not show any change for the worse, so there was no reason to give the slightest cause for calling off the start. The sky got clearer continually. Mr.

Calwagen had the opportunity of following the ascension of a pilot balloon with binoculars to a height of 4,000 metres. It showed a north-easterly wind, apart from the lowest belt, where the wind blew south-east from King's Bay. The north-east wind high up had a speed of between 18 to 20 kilometres per hour. Therefore, if this strength should continue throughout the eight hours of the flight towards the Pole, it would give the planes a deviation of 130–160 kilometres. So much petrol was to be kept in reserve that the last stretch could also be flown, specially if one could reckon on the wind being *with* the planes throughout the flight homewards. Mr. Calwagen wrote down the results of the pilot's calculations and handed them over to Captain Amundsen, to assist him in the work of navigation.

Herewith the task of the meteorologists was ended, and in the last unforgettable minutes we all stood as spectators, filled with admiration for the six brave men who smilingly said good-bye as if they were just going on an everyday flying-trip. Not long afterwards both machines were out of sight in the bright blue sky, flying in the direction of Cape Mitra.

* * * * * *

Forty-five days later the polar flyers are home in Oslo again and Captain Amundsen and Ellsworth's meteorological notes are handed over to us. We read them through with excitement. They contain news from that part of the world which otherwise is out of the meteorologist's reach. They give him something to think about—especially after he has dared to predict what kind of weather the polar flyers were likely to meet in the unknown.

We start with the reports referring to the very

beginning of the flight from King's Bay, and see what the meteorological notes tell us.

After flying along the coast and passing the seven glaciers, the flyers find Danskeöen's and Amsterdamöen's hills enveloped in fog, which continues northwards as far as the eye can see. What can this have been caused by ?

I cannot judge by personal examination, because when 12 hours later we ourselves arrived up at Danskeöen on board the *Farm* there was not a sign of fog to be seen. But I am inclined to believe that the fog has been composed of a layer of certain low-lying clouds, which had often been seen by us at the beginning of May while we were lying in Syd Gat waiting for suitable weather for the expedition's start. These clouds will often just form suddenly, when a cold wind blows from the polar ice, towards the open sea. The moment the air arrives over the first water-lanes or open sea it gets heated from below. The heated layer rises above and whilst ascending forms clouds. Other colder parts of the air then come into contact with the water, get heated and rise, also forming clouds, etc. According to the observations which we had occasion to make at Danskeöen, in the beginning of May, the lower surface of these clouds is about 200 metres from the ground. Below this there is generally a thick mist of fine snow, which reduces atmospheric visibility, and will certainly be very disturbing for flying. Luckily these clouds do not reach to any great height, seldom over 1,000 metres, so that one can easily fly above them. Besides, one can count on them not forming further north than where one finds open water channels of fairly large dimensions. It is, therefore, not *too* risky, to undertake a flight above the cloud-belt, towards clearer weather further north

The polar flyers took this risk, and quite rightly too. After two hours' flight from Danskeöen going northwards there were no clouds, and on the remainder of the flight there was nothing that obscured the view over the polar ice.

The expedition has here made a meteorological reconnaissance of great importance to all later flying explorations in the Arctic.

If a cold wind blows from the Pole one must reckon with the formation of a low cloud belt over the wider water channels, even if it is cloudless nearer the Pole. These clouds will form themselves at all seasons of the year, but perhaps mostly in the colder periods, when the difference in temperature between ice and sea is greatest.

The landing took place in a light wind, therefore probably near to the centre of the high pressure region, which covers the Arctic Sea. On the way into the high pressure region the wind, however, must have been considerably stronger as is shown by the very considerable deviation of 250 kilometres on an eight hours' flight. In the middle period of the flight it must, therefore, have been 30 kilometres per hour, which is considerably more than the pilot observations over King's Bay had shown, namely, 20 kilometres per hour. The aeroplanes must have flown, therefore, through a zone with strong north-easterly winds, blowing north of Spitzbergen, and then later come into calmer wind conditions nearer the Pole.

This raises the question : Could one not have found a day with a gentler wind blowing, when the deviation would have been less and the Pole might have been reached ? Probably the next day, 22nd of May, would have been better as far as wind was concerned. Mr. Calwagen measured the speed that day at Danskeöen, finding an east wind blowing 3 kilometres per hour

at a height of 500 metres. This wind would only have brought about a deviation of about 100 kilometres. But, according to Amundsen's observation reports there was, on the same day, a little northerly breeze at the landing-place at 87° 43′, which means that a contrary wind was also blowing on that day over the district nearest to the Pole. And what was worse, on the 22nd May, there was no longer clear weather near the Pole.

The observations were as follows. During the last two hours of the flight, slight high clouds had begun to appear, but not so dense that they could prevent the taking of solar observations immediately after landing. The next day the clear weather was gone and solid grey cloud layers covered the whole sky. It was the polar summer weather which had started, just as we calculated it would from the *Fram* expedition's observations. And it did not improve during the following days: the 23rd, 24th and 25th were all grey-weather days, certainly without rainfall, but also without sunshine. A northerly breeze was blowing on the 22nd, 23rd and 24th, but it got calmer on the 25th.

How does this condition look on the chart? It shows very little change (see Fig. 6). The big high pressure region which we had over the Arctic Sea on the starting day continued, and the polar flyers must have been very near the high pressure centre as they now had calm weather. As far as could be seen everything looked favourable on the chart, and whilst we were lying and waiting at Danskeöen in radiant sunshine, the whole day long, I personally thought that this good weather would certainly stretch right up to the Pole. But here the expedition's observations have taught us something else, that in the best of weather conditions there is grey weather at the Pole when the year is so far advanced as the end of May. This is also one of the new

Chart Showing Course.

meteorological results which this expedition has brought to light—in regard to the *Fram's* expedition it happened that they did not meet any high pressure regions at the end of May.

There were a few occasions when the clouds broke up at 87° 43′ ; for instance, the 29th of May (see Fig. 7) " dawned with sunshine from an almost quite clear sky." But this was only a sign that worse weather was approaching. In the night, between the 28th and 29th, snow had passed Spitzbergen on the way north. It reached the polar flyers on the 30th in their camp 87° 43′. The clearing on the 29th was, therefore, just a passing phenomenon, and if the aeroplanes had started that day southwards they would, after a few hours' flight, have got right into a heavy snowfall. These clearings, before the large wandering snow-masses, are well known in lower latitudes. It is, however, interesting for meteorologists to find that the same rules also apply to the weather conditions at the Pole.

Now follows a period of principally southerly and south-easterly winds which cause the temperature to rise quickly. On the coldest day, the 24th of May, there had been −12.5° C., but at the end of the month we already had −7° C., and on the 7th of June the temperature was up to 0°. This enormously quick change from winter to " summer temperature " is typical of the polar conditions.

" Spring " does not last " months," as in the lower latitudes—it is finished in a few weeks' time.

From the 7th of June onwards the temperature did not rise much, it remained about 0°. Sometimes a little over, sometimes a little under. One can say that 0° is the characteristic summer temperature of the Arctic region. Warmer air than 0° is very often carried there from lower latitudes, but this gets cooled down

immediately through contact with the ice, and gets a temperature of about 0°. As mentioned before, it is this cooling down which is responsible for the fog, because it causes the air's moisture to condense. The first fog, which extended right down to the ground, was observed on the 2nd of June ; the next was on the 8th of June, and thereafter happened fairly often, so in the end, whole days free of fog, were exceptional.

Luckily, on the 15th of June, when the starting-place was ready, there was sufficient visibility for them to start, and to find their way out of their "Foggy-home."

PART VI

ELLSWORTH'S ACCOUNT

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SO long as the human ear can hark to the breaking of waves over deep seas, so long as the human eye can follow the gleam of the Northern Lights over the silent snow fields, then so long, no doubt, will the call of the Unknown lure restless souls into those great white Arctic wastes.

I stop to try to recall when it was that my imagination was first captured by the lure of the Arctic. I must have been very young, because I cannot now recall when first it was.

On the Alaskan side of the Pole alone lie 1,000,000 square miles of which we know nothing. How do we know there is land there? There must be: if it were only sea space there, then the flood tides would reach the Alaskan coast from the north; but no flood tides reach it from the north. The times and ranges of the semi-daily tides between the Greenland and Alaskan coasts also prove the existence of some obstruction in the Polar Sea. The great age of the ice in the Beaufort Sea is another indication of land in the Arctic.

The large blank spaces surrounding the North Pole —that word "unexplored"—have been a challenge to the adventurous since charts were first made. For nearly four generations now that blank, mysterious plain has been the ultimate quest of numberless adventurers.

Before this 1925 adventure of ours, explorers had depended on ships and dogs entirely for headway.

Looking back on the ship and dog days, what days they were! What small profit those men got of their vast expenditure of time and energy. I say that with only admiration for what they did, for the courage and hardihood of men who cut adrift from civilization and set out with dogs or their own legs for motor power over the tractless ice fields of the far north. All honour to them, but what an utter neglect it seems now of the resources of modern science!

No doubt the very men who have been through it best realize what a hopeless, heart-breaking quest it was under the old methods. Peary's land base at Cape Columbia was only 413 miles from the Pole, yet it took him 23 years to traverse that 413 miles.

Peary was the first man with whom I ever discussed the matter of using an airplane for polar work. This was shortly before his death, and I was dining with him at his home in Washington. Peary believed in the use of airplanes in the Arctic.

My mind never did free itself for any great length of time of the airplane idea for Arctic service. In the autumn of 1924, Captain Amundsen arrived in New York for his lecture tour of the United States. He had already made public his belief that the Polar Sea could be successfully crossed in an airplane. Happening to be in New York when he arrived there, I looked him up. We had a long talk.

I told Amundsen of my freshened interest in the airplane idea since reading of his belief in it. We went over the matter together. I believed that my father could be induced to finance the attempt if he could meet Amundsen.

My father was enthusiastic after meeting him, and aided us to the extent of buying two Dornier-Wal flying-boats, built in Pisa, Italy.

I sailed for Norway to join Amundsen and get in touch with the Aero Club of Norway, who were to sponsor the expedition.

We were given a tremendous reception in Norway by the officials and people generally, and a tremendous send-off when, on April 9, we sailed for Spitzbergen.

After a boisterous voyage by steamer, during which we passed fields of floating ice, we arrived off King's Bay, Spitzbergen. The bay was frozen. It took us two days to blast and push our way up to the docks of the King's Bay Coal Company.

The Island of Spitzbergen is ideally situated to serve as a base for a polar expedition. Besides its nearness to the Pole—ten degrees, or only 600 nautical miles—the western and northern coast of the island is thawed by a warm current, an offshoot from the Gulf Stream. The effect of this current is to produce ice-free water at the highest latitude in the world.

The midnight sun was another factor in our plan. From April 19 to August 24—127 days—there is that beneficent light to count on.

We spent five weeks at King's Bay, assembling our planes and waiting for the weather to moderate. During this time the King's Bay Coal Company were our hosts and did everything to make our stay enjoyable. Captain Amundsen and I spent all our mornings together studying navigation and perfecting ourselves in the use of the sun-compass, the drift-finder and the sextant. In the afternoons we would take long ski trips.

Towards the end of May our meteorologists decided that it was time to get under way. We feared to start too early because of the effect of the cold on our motors—it would be at least ten degrees colder at the Pole—and it was a risk to start too late, because of the fog banks that hung over the polar pack during the summer months.

May 21 was the day we chose for the start of our great venture. It was thrilling to think, when a man came awake that day, that in a few hours we would be on our way into the Unknown.

We boarded our planes. There were many fervent handshakes and quiet words of cheer from the immediate group; also many cheers from the people lining the wharves and shores of the bay.

We are carrying 7,800 lbs. of dead weight in each plane. That is 1,700 lbs. above the original estimate, but we see nothing that we can afford to leave behind. The skis, canvas canoe, collapsible sled for drawing the canoe, shot-gun, rifle and 300 rounds of ammunition, etc., are for emergency, in case we are set on foot and have to abandon the planes and walk over the ice to Greenland. We were strongly urged to take along a radio outfit, a most useful thing in case we got into trouble; but the weight of it—300 lbs.—made us say no.

Each plane carries 90 kilos of provisions, sufficient to last three men one month at the rate of two pounds per day per man. Our daily ration list per man is:—

Pemmican	400 gr.
Milk chocolate	250 „
Oatmeal biscuits	125 „
Powdered milk	100 „
Malted milk tablets	125 „

At 4.15 all is ready for the start. The engines are turned over for a warming-up. At five o'clock the full horse-power is turned on. We move. The N.25, Captain Amundsen navigator, leads the way. Riiser-Larsen is his pilot, Feucht is his mechanic. I am navigating the N.24, with Dietrichson for pilot and

Omdal as mechanic. Six men in all—there is no room or duty for more than these.

N.25 trembles, goes forward, hesitates, moves onward, drops down off the bank on to the ice of King's Bay. I was not conscious of our own take-off. I was busily occupied arranging my instruments: when I did get time to look out to see how we were getting along—my notion being that we had only just left the earth—instead of the ice of King's Bay that I expected to see beneath me, it was far out upon a majestic panorama, the mountain tops and glaciers of Spitzbergen, that I found myself gazing. It is rather a surprise to find yourself looking into eternal space, when it is solid earth you expect to see directly below.

Within a half hour after leaving King's Bay we ran into a heavy bank of fog. We rose to 1,000 metres to clear the fog. Rising well above it we saw, outlined against the fog, a double halo. In the middle of the halo was a perfect shadow of our plane. Evanescent, phantom-like, these two multi-coloured halos seemed to be beckoning us enticingly into the Unknown. During that first hour through rifts in the mist we caught glimpses of the open sea. Then followed an hour or so of an ocean with small, loose ice-cakes, which indicated the fringe of the polar ice. "Then suddenly," as Captain Amundsen put it later, "the mist disappeared, and the entire panorama of polar ice stretched away before our eyes—the most spectacular sheet of snow and ice ever seen by man from an aerial prospective."

From our altitude we could overlook sixty or seventy miles in any direction, which means that we had within our view an expanse of between 3,000 and 4,000 square miles. And that entire flat surface was one vast and dazzling glare of ice and snow beneath the sun. From where we were it was all smooth to look at—no hill nor

contour of any kind to break the monotony. Only a network of narrow cracks, or leads, scarred the surface of it.

We were entering the Unknown. The silence of the ages was now being broken by the roar of our motor. Never before had man launched himself into such unknown space, and of all space an uncharted sea, at seventy miles an hour. I gazed on that tremendous surface, and then at our planes. We were like gnats in an immense void. We had burned our bridges, broken all contact with civilization. What lay behind counted for nothing now; time and distance suddenly seemed to count for nothing. Only what lay before us counted now:

> "Something hidden—go and find it,
> Go and look behind the Ranges—
> Something lost behind the Ranges,
> Lost and waiting for you. Go!"

For hour after hour we sped on—driving, driving, always driving, knowing only that we must go on and on over that interminable sheet of ice.

When we left our base the sun had been at our left hand. It now hung low in the sky directly ahead of us. It was midnight, the time set for the end of our drive. Our dead reckoning showed that we had traversed a space of 1,000 kilometres. We should now be at the Pole. The Pole was under us, if nothing had checked our headway.

It was a sweet thought, but it could hardly be true; because of the fog which lay along the horizon we could not take a sextant shot at the sun, but we knew we had been bucking a strong north-east wind and we must have been carried to the westward of our course.

I felt certain that we could not yet be at the Pole

Ellsworth Before, During and After the Flight

and so when I saw N.25 ahead of us begin to circle and then descend, I was surprised to see her circling around. Our petrol tanks were half empty. It was a strange thing that just then, as our petrol tanks were half empty, that there ahead of us was the first lead of water large enough for an airplane to land in that we had seen in our whole journey of 600 miles over the ice. Why this should be the first open lead of any width in all the 600 miles we had flown, where it ended, just how wide it was, we never found out. We only had time to see that there it was for our landing.

It was at 1 a.m. on the morning of May 22 that we landed. From 500 metres in the air it was not such a bad-looking place to be dropping into, but it was an awful-looking hole, we saw, as we drew nearer to it.

We circled for perhaps ten minutes looking for a suitably-sized spot of clear water to land in. There was no such space to be found. The lead was a choked-up mass of floating lumps of ice, as though someone had started to dynamite the ice-pack and had given up the job when half-way through it. Ice-blocks standing on edge or piled high on top of one another, hummocks and pressure-ridges, was all that greeted our eyes. It was like trying to land in the Grand Canyon.

We came down in a little lagoon among the ice-floes, taxied over to a huge ice-cake, and, anchoring our plane to it, jumped out with our sextant and artificial horizon to find out where we were. Not knowing what to expect I carried my rifle, but after our long flight I was a bit unsteady on my legs—I tumbled down in the deep snow and choked up the barrel.

We spoke to each other as we stepped out on to the ice-pack—spoke but got no answers. Our lips moved, but no word issued therefrom. Eight hours at close quarters with our motors had left us temporarily deaf.

We stared at each other. Our eyes, when we took off our goggles, showed themselves blood-shot.

It was a ghostly scene. It was one o'clock in the morning and the midnight sun hung low above the northern horizon—a pale red orb to look at, radiating a little light but no heat.

The silence of the ages hung over the sea. Cataclysmic forces must have been at work before ever those huge blocks of ice could be torn loose and thrown up from the ocean's bosom, but not a whisper of a sound was now disturbing the silence. It seemed as though the world had died, leaving only us to view its frozen corpse.

A ripple disturbed the surface of a small patch of water near our plane. We saw ripples circling from something round and dark. It was a seal thrusting his sleek, black head up through the icy water. The sight of him gave us a shock. He seemed out of place, a touch of life in all that death-like scene.

"What's he doing here?" I found myself whispering.

The seal might have been asking himself the same question concerning us, for he looked as surprised as we looked. He stared at us with wide eyes, half-raised himself by his fore-flappers out of the water, as if to see us better. He had no fear of us—only surprise; he paddled quite close to us. We had no thought of killing him—the problem of short rations was not haunting us then. There were times later when he would not have lived four seconds.

His curiosity seemingly satisfied, his flappers collapsed under him, he sank slowly into the water, disappeared from sight, and never again outside of our own selves and three stray birds which I shall tell of later, did we see a sign of life in all that polar country.

Observation showed that we were in latitude 87° 44′ N., longitude 10° 20′ W. This westerly drift of more than

N. 25 ON THE WATER

twenty degrees had cost us nearly a degree in latitude, and enough extra fuel to have carried us to the Pole. As it was, we were just 136 nautical miles from it. At the altitude we were flying just before descending, our visible horizon was 46 miles; which means that we had been able to see ahead as far as latitude 88° 30′ N., or to within just 90 miles of the North Pole! Eight hours after leaving civilization we were able to see within 90 miles of the goal that Peary had expended 23 years to reach. Truly "the efforts of one generation may become the commonplace of the next."

When we had finished taking our observation we began to wonder where N.25 was. We crawled up on all the high hummocks nearby and with our field-glasses searched the horizon. Dietrichson remarked that perhaps Amundsen had hopped off and gone on to the Pole. "It would be just like him," he said.

It was nearly noon of that day before we spotted N.25 from one especially high hill of ice. She lay in among a group of rough hummocks, not more than three miles distant.

It was a rough-looking country everywhere, and the position of N.25 was not cheering to behold. Her nose was pointing into air at an angle of 45°. Just ahead of her was a huge cake of old Arctic blue ice that must have been 40 feet thick. From where we were it looked as if she had crashed into this great wall of ice.

Our own plane was in bad shape. We had torn the nails loose on the bottom of the plane when we took off from King's Bay, so that she was leaking badly; even now the water was above the bottom of our petrol tanks. Also, only one engine was working—the forward propeller was out of commission. In short, we were wrecked. Things were so bad that it seemed as if only a miracle could ever get us out.

During that first day Dietrichson and I tried to reach N.25, Omdal staying behind in an effort to repair the damaged motor. We dragged our canvas canoe up over high hummocks and tumbled into deep crevasses until we were thoroughly exhausted. The snow was two to three feet deep over all the ice, and we floundered through it, never knowing what we were going to step into next. Dietrichson went down between the floes and only by hanging on to the canoe was he able to save himself from going in over his head. An open lead, whenever we found one, was always covered over with a scum of new ice just thick enough to keep us from using the canoe, but not thick enough to let us walk on it with safety. As a result we did not get far on that first day's trip to N.25. After half a mile we had to give it up and return.

We pitched our tent on top of the ice floe, moved all our equipment out of the plane and made ourselves as comfortable as possible. But there was no sleep for us, and very little rest.

Omdal continued to work on the motor ; Dietrichson and I took turns at the pump. Only by the most incessant pumping were we able to keep the water below the petrol tanks. While working the pumps we could not keep out of contact with the water. The temperature was −11° C.

On first sighting N.25, we had run up our Norwegian flag on top of a high hummock on our ice-cake, hoping that her crew would see it ; but they gave no sign of seeing us on that first day. We rigged our small inflated balloons that the meteorologists had given us wherewith to obtain data regarding the upper air strata, tied pieces of flannel to them and turned them adrift. Our hope was that the wind would carry them over to our N.25 comrades, and indicate to them in which direction to

look for us ; but it was a contrary wind : it blew them in the wrong direction or, drifting them too low, tangled them among the ice hummocks.

Throughout our first day the wind was from the north and we could see quite a few patches of open water ; but on the second day the wind began to blow from the south, and the ice to close in around us. The closing ice-pack was like the grasp of a great claw that was slowly but surely contracting.

On our third day, May 24, the temperature being −11.5 C., our pump continued to freeze up. We had to keep thawing it out. The heavy, high ice between us had now drifted out from between the two planes, leaving N.25 in plain view.

On this day, using our flags in order to semaphore, we established a line of communication between the two planes ; but it was tedious work and required two men, one with the flag, and the other with a pair of field glasses to read the signals. We then had to wait for their return signals before sending another message.

On this day also, after an exchange of messages, we decided to try to reach Amundsen ; so we packed our canvas canoe, put it on the sled and started across what looked to us like mountains of hummocks. After a few hundred yards we had to give up : the labour was too exhausting.

We now broke our load into packs of about fifty pounds, put on our skis, and covered our canoe with canvas, but after a few hundred yards we had to drop the canoe. We put our skis on most loosely, for there was no knowing when one of us might drop into the Polar Sea ; and to drop in, or to get tangled up in loose slush and ice, with a pair of skis fastened to our feet, would be disastrous.

After travelling for two hours and fifteen minutes,

we reached the wide lead which separated us from N.25.

New ice was forming on each side of the lead. We could see no way for us to cross. So, after a seven hour trip, in which we covered perhaps five and a half miles in about the same length of time it had taken us to fly from Spitzbergen, we returned to our sinking plane.

We pitched camp anew. We cooked pemmican soup over our Primus stove. Dietrichson gave us a surprise by producing a little tin of George Washington coffee. We took some of the pure alcohol carried for the Primus stove and poured it into the coffee, and, with pipes lighted, felt more or less happy.

As we smoked in silence, each with his own thoughts, Dietrichson suddenly cried out, "I can't see!" He had become snow-blind.

Dietrichson did not know what was the matter. We had been careful to wear our snow glasses during most of the journey, but not careful enough. After bandaging up his eyes, Omdal and I put him to bed.

Before midnight of this day snow began to fall. Omdal and I had thawed out the pumps and we were treating ourselves to a couple of hours' rest from the labour of pumping and trying to repair the motor. The snow drove us into our sleeping bags to keep warm and dry. It was wet snow, and we had to spread our sealskin parkas over the ground cloth to keep the sleeping bags dry. If the sealskin had once got wet, there would have been no way for us to dry them out.

At seven next morning the temperature was down to −9.4 C. It was still snowing, but the wind had shifted around to the west. We decided, if that space of clear water expanded to any extent, to try to get our plane on to the ice-floe. In anticipation of that event, Dietrichson took to shovelling off a level space on our ice-cake.

The whole floe was about 200 metres in diameter, with perhaps one level stretch of 80 metres. There was two feet of soggy wet snow that had to be cleared away before we could reach the solid ice of the floe. It was laborious work for all, for we had only a home-made clumsy wooden shovel and our ice anchor to shovel the snow with. I loosened the snow by picking at it with the anchor, and Dietrichson shovelled it away.

Looking through our glasses at N.25, we could see her propellers going, and Amundsen pulling up and down on the wings, trying to loosen the plane from the ice, but she was immovable.

On the morning of May 26, N.25 signalled us to know how we were making out with the salvaging of our plane. We passed the return message that we had succeeded in getting her nose up on to the ice-cake, but that with only one engine working, it was impossible to do more. She was safe now from sinking, but not from being crushed should the ice move in on to her.

Amundsen signalled back that as it did not look good for our plane, we had better come over to his camp and help save N.25. We signalled that we were coming. This was the fifth day of our separation.

The ice had been steadily shifting, until the two camps were now no more than half a mile apart. One wide, newly frozen-over lead, with a few high hummocks and some old piled-up ice directly in front of their plane, now obscured our view of their camp as we journeyed toward them. Not knowing whether we should be able to return, we had made up everything portable into packs. These packs weighed eighty pounds each. We were well aware of the chances we were taking in trying to cross the newly-frozen ice with such heavy loads on our backs, but we saw nothing else to do. We must get all possible stores and equipment to N.25, if

we were to be of any real help in the fight to get back to civilization.

With our feet shoved loosely into our skis, we shuffled along, slowly feeling our way over the new thin ice. Omdal was in the lead, Dietrichson in the rear, and I in between. Suddenly I heard Dietrichson yelling behind me. Before I knew what it was all about, Omdal, ahead of me, cried out also. With the cry, I saw Omdal disappear. The ice under me started to sag, and I jumped quickly sideways to keep from falling through. There happened to be a ledge of old ice just beside me. Lying down on my stomach, half on this ledge of old ice and half out on the new ice, I reached a ski out, and pulled Dietrichson over to where I could grab his pack, and partly pulled him out on to the firmer ice. He lay there panting, exhausted.

I turned to Omdal. Only his pallid face showed above water. As I reflect on it now, it was strange that although these two Norwegians had been conversing almost wholly in their native tongue, Omdal was now yelling in English: "I'm gone, I'm gone!" And he was almost gone too. He had been digging his fingers into the ice edge to keep from being pulled under, but the ice kept breaking under him. I reached him and drew him over on to the firmer ice before he could sink, and held him up there by his pack. I then called to Dietrichson to crawl over to me and hold up Omdal. Dietrichson came over and held Omdal, while I cut the heavy pack loose from Omdal. It took all the strength the two of us had left to drag him on to his stomach and up on the firm ice.

Throughout all this, the crew of N.25 could not see us, and if they had been able to see us, they could not have reached us, this because of the high ice which lay in front of their plane. They could hear our cries, but

could not aid us—they could only wait, listening and wondering to each other the nature of our distress.

We hurried on to reach Amundsen's camp, where Dietrichson and Omdal got into dry clothes, drank a hot cup of chocolate and were ready for work again. Omdal's fingers were swollen and lacerated from digging into the ice; he suffered with them for a long while afterwards. Both men had lost their skis. In view of the probability of being forced to tramp to Greenland, the loss of the skis seemed a calamity.

It was good to be with our old companions again. We joined in the work of freeing N.25 from her precarious position. She lay half on and half off an ice-floe. Her nose was up on the cake, and her tail down in the sea. Her manner of landing had reduced her speed so much that she had run up on to this floe with comparative gentleness, and so saved herself from crashing into the heavy cake of blue ice which lay directly ahead; but whereas she had found sufficient open water for a landing now —only five days later—there was not sufficient clear water to launch a rowboat into. The drifting ice had locked her in.

A most orderly routine was in force at the Amundsen camp. Regular hours for everything: sleep, eat, smoke and talk; no need to warn these men, as so many explorers have had to do, not to tell one another the story of their lives, lest boredom come. These Norwegians have their long periods of silence, in which the glance of an eye or the movement of a hand takes the place of vocal expression.

One might have expected hurry and disorganization in the conditions that confronted us, but it was just the reverse. We did everything as though we had oceans of time ahead of us. It was this calm, cool, unhurried method of doing things that conserved our energy,

kept our spirits normal, and eventually got us out of a desperate situation. It may seem strange that no one among us ever got completely depressed or blue, but so it was.

We made five unsuccessful attempts to get N.25 into the air; after each failure we felt a natural disappointment, but Faith never left us.

> "From hopes cut down across a world of fears,
> We gaze with eyes too passionate for tears,
> Where Faith abides though Hope be put to flight."

These beautiful lines of Swinburne's seemed to have been written for us. How true they were! Hope may have grown weak, but Faith was strong within us.

We elected Omdal our cook, and he made chocolate and pemmican soup until the time came when we decided we had to cut down our rations. Although we felt better nourished and stronger after our noon cup of pemmican soup, it was always the morning and evening cup of chocolate that we looked forward to most eagerly.

The after-compartment of our plane, where we cooked and ate, was dark and draughty. The cold Duraluminium metal overhead was coated with hoar-frost which turned into a steady drip, drip, drip upon us as the heat from our little Primus stove, together with the heat from the steaming chocolate, started to warm up the cabin. Feucht always sat opposite me—I say sat; in fact, he squatted—we all squatted in the bottom of the plane with our mug of chocolate between our knees. I remember how I covertly watched him eating his three oatmeal wafers and drinking his chocolate. I always tried to hold mine back so as not to finish ahead of him. I came to have the strange delusion that if I finished first it was because he was getting more to eat than I was.

Omdal Before, During and After the Flight

We were all glad, after we had finished our meal, to get out into the open. The sun, pale though it was, and the open air, chill though it was, were a relief.

We aimed to smoke a pipeful apiece after each meal, but unfortunately we had taken only a few days' supply of smoking stuff. When that went we had to resort to Riiser-Larsen's private stock of chewing tobacco, a rank black twist. It took a real hero to smoke that stuff after wetting it so as to make it burn slowly and hold out longer. Some of us got the hiccoughs after a dose of it.

Captain Amundsen and I slept together in the pilot cock-pit, which we covered over with a canvas to darken it at night. I found it difficult to get accustomed to the continuous daylight. The monotony of it was wearing. Omdal, Feucht and Dietrichson slept on their skis stretched across the freight compartment, which served us for a month as joint bedroom, dining-room, kitchen and living-room. Riiser-Larsen had the tail all to himself, and into this he had to crawl on his hands and knees.

It took us one whole day to construct a slip and work the plane up on to the ice-cake. The work was exhausting on our scanty rations—a cup of chocolate with three oatmeal wafers night and morning and at noon a cup of soup made from 80 grammes of pemmican. We had only the crudest of implements to work with—three wooden shovels, a two-pound pocket safety-axe and an ice anchor. We lashed our sheath knives to the end of our ski sticks to further the work.

The floe we were on measured 300 metres in diameter. A 400-metre run would give us a fair chance to take off. Our best chance, of course, would be to take off in open water, but the wind was still in the south, and south winds did not make for open water.

As the days went by we gave up hope of open water : we would have to depend on a take-off from the ice Riiser-Larsen was the most tireless of all of us in a search for a floe of the right dimensions. If any of us found an ice-floe of sufficient area for a hop-off, we felt it would be Riiser-Larsen.

We toiled on. By May 28th we had freed N.25 from the screwings of the pack-ice. On this day we took two soundings with our Bewhloth Echo apparatus and got a depth of 3,750 metres. This depth corresponds almost exactly to the altitude of Mont Blanc above the village of Chamounix. Up to this day our only thought had been to clear the plane and hurry on to the Pole ; but now, if we were to save our lives, we saw nothing for it except a return to Spitzbergen.

Our hope of reaching Spitzbergen rested in salvaging the petrol from N.24. It must be borne in mind that we were continually expending petrol in our attempt to free the plane. By a circuitous route Dietrichson, Omdal and I, with our canvas canoe on a sledge, got across to N.24 for petrol and the remaining supplies. It was cold, the temperature at 9° Centigrade below freezing.

We cut out one of the empty tanks, filled it from a full one, loaded it in our canoe, put the canoe on the sledge and started back. We did not get back with the extra petrol—not that time. A large lead had opened up while on the way and we barely got across. We had to abandon the tank on the ice, but that same night the lead closed again, and Dietrichson and Omdal got the petrol over. The light sledge got broken among the rough hummocks. We now had 245 additional litres, 1,500 litres altogether—a margin of 300 litres above our estimate of the amount needed for N.25 to fly back to Spitzbergen—to fly back, we amended, if, of course, we were ever able to get the plane into the air again.

Our position was now so bad that we took an inventory of all our provisions, and we found we had :

Pemmican.....	285 half-pound cakes
Chocolate	300 bars (or cakes)
Oatmeal biscuits	3 ordinary tins
Powdered milk.....	3 packages of 12 lbs. each
Horlick's malted milk....	42 tins
Kerosene (for Primus stove)	25 litres

Later we used petrol for the stove.

Our observation on May 31 showed our position to be 87° 32′ N., and 7° 30′ W., which meant that the whole pack has been moving steadily south-east. It was some consolation to know that we were working back to the south, where we knew we would find game. How we would have liked to have had the seal who poked his nose above the ice-edge that first day ! Except for him we had seen no life of any description since, either in the water or in the air—not even a track in the snow to show that in these latitudes there was any living thing other than ourselves.

On June 1st we decided that we might finally have to abandon the plane and march to the coast of Greenland. And with a view to having sufficient provisions left for that 400-mile hike over the ice-pack, we reduced our daily ration to 300 grammes, or one-half a pound per day per man. On this half-pound a day we cut out and shovelled away, by Captain Amundsen's estimate, 300 tons of ice during the 24 days we strove to free the plane ; and we did it with the three wooden shovels, one small pocket axe, our sheath knives and a small ice anchor.

By thus cutting our rations in half we figured that they would hold out two months longer. Captain

Amundsen had set June 15th as the date on which something would have to be done. On that day we would have to decide whether we would start on foot for Greenland or stick by the plane, this last with the expectancy of open water coming.

Opinion was divided. It seemed absurd to think of starting out on a 400-mile tramp with thirty pounds apiece on our backs and dragging along a canvas boat on a sledge—the sledge for crossing "leads"; and this on a journey that none of us thought we would ever end alive, when right beside us lay two powerful motors with 700 horse power which in eight hours could get us back to civilization again—if we could get them and their plane up into the air. It was exasperating to think that we couldn't.

The doubts regarding the tramp all came from our not knowing just how far this bad ice country extended. Climb up as high as we could we were never able to see the end of it. Did it extend all the way to Greenland or not? That uncertainty was why we found it so hard to decide what to do. For myself, I had decided that if I ever succeeded in travelling as much as a hundred miles toward Greenland, I would be doing pretty well; yet I agreed with Captain Amundsen that I preferred to "finish it" on my feet, to set out on the long hike to Greenland, rather than to remain supinely by the plane and watch the last of our food go. Riiser-Larsen was for starting to Greenland on the 15th. Feucht said he would stick by the motors and that nothing could induce him to walk. I finally said I would prefer to wait until the 14th and see how things looked then—maybe by then there would be some more favourable indication of open water; for as Captain Amundsen had said, with the coming of Arctic summer the leads were bound to open.

To put it briefly, the result of the vote showed that no man knew what he really wanted to do. "Life is but a ball in the hands of Fate," was a saying of Amundsen's : so why make a decision so early ?

After our evening cup of chocolate Captain Amundsen and I generally put on our skis and took a few turns around the ice-floe before turning into our sleeping bags. I acquired the habit of asking him on these walks what he thought of our chances. Invariably he replied that things looked pretty bad, but he was always quick to add that it had always been his experience in life that when things looked darkest there was most surely light ahead ; and he illustrated his point by telling me of experiences he had during his other polar explorations.

On May 31 there was eight inches of ice in the lead, on the far side of the floe we were on. We decided to try to make a take-off on that eight-inch stuff.

From our ice-floe down on to this lead there was a six-foot drop, making it necessary to construct a slip on which to get our plane down on to the lead ice. We built the slip in accordance with standard road-making principles ; first laying down heavy blocks of ice and solid snow above them, then smaller blocks of ice and tiny lumps ; over all we spread a layer of loose snow which worked down into the crevices and solidified into a smooth surface. To construct the slip for our take-off, to level off all the bumps and ridges thereon, took us two days.

On June 2, at 5 p.m., our slip was ready. We started up the motors, taxied across the floe and down the slip. With full speed ahead we started across the ice of the lead, but were hardly upon it when it began to sag beneath our plane. Soon we broke through. We ploughed on through it for one thousand metres, but it was no use. The heavy ice clung to her sides ; we could not get her

into the air. We shut off the motors and let her rest for the night in the lead.

At midnight I was awakened from a sound sleep to hear Captain Amundsen calling out that the plane was being crushed. I listened. I could plainly hear the pressure against her metal sides. We pitched in and got everything out of her on to some solid ice. We then turned our attention to the plane itself.

By pulling up and down on the wings, "jouncing them" up and down, we held her from settling into it until the moving ice had time to close in underneath her. The ice passed under her and so we were saved for the time. As Riiser-Larsen commented after the screwing stopped: "Another chapter for our book!"

Before morning our first heavy Arctic fog set in. That fog meant that the Arctic summer was upon us. From then on we knew we would be continuously enveloped in fog. It hung like a grey garment over us. Above it we could see the rim of the sun. Above that fog the sun was golden and the sky was blue; but that was up above and we were down below. The air was warmer this day—the temperature rose to freezing. That fog stayed with us for all the rest of our time in the Arctic.

While we could not see far, at least we could keep on working. We levelled and smoothed a new course, but could get no wind to help us rise. However, we tried it, but our heavily-loaded plane broke through the ice—

> "Trailing like a wounded duck, working out her soul,
> Felt her lift and felt her sag . . . . . .
> Wondered every time she raced if she'd stand the shock——"

The plane started leaking from the pressure of the ice, and we wonder how much more she can stand. We were gradually working towards N.24. After

another day of labour and trial, we bring the two planes together.

How weather-beaten and forlorn my old N.24 did look when we reached her! Her nose lay up on the ice-floe, and she was listed to one side, with the ice frozen in all around her. The tip of one wing was frozen hard in the ice.

There was a long lane now of freshly-frozen ice in front of N.24, but the old ice had so pressed in from both sides that parts of this lane had been pushed out into a curve. It was a narrow, crooked passage, but it offered an opportunity for a take-off in N.25.

We tried it, taxi-ing N.25 carefully down the crooked lane, and came very near to being wrecked. In trying to make the curve under reduced speed, her bow breaks through the ice, she slows down, lifts her tail into the air, comes to a dead stop. We jump out and hack away at the ice until she settles on an even keel.

The main body of the pack is in motion under us. We will have to get out of there and get out quickly. At two o'clock in the morning we begin work on an extension of our course and continue on throughout the following day, and on into the night.

The floe is covered with tightly-frozen lumps and old pressure ridges of up-tilted ice-cakes. Hacking away with our short-handled pocket-axe and ice-anchor as we stand on our feet is such back-breaking work that we change over to going down on our knees to it, which position we do not like. Working on our knees there is danger of having our snow-glasses broken by the flying pieces of ice, and without our glasses snow-blindness is certain.

The sweat was rolling down my face, vapour was rising from the sweat while at this work of smoothing down the ice. I removed my glasses to clear them of the

congealing vapour. I did not have them off for long, but it was long enough. That night I went badly blind in one eye.

Dietrichson went blind in both eyes. For the following two days he had to lie in his bag, his eyes tightly bandaged, suffering from acute inflammation.

We had established regular nightly patrol, each man taking his turn at five hours of patrolling on his skis, watching to cry the word of any open water. Around and around we would circle the floe for those five long hours. Conditions alter so suddenly in the Arctic ice-field that no one can foretell at just what hour a chance might come for us to be up and away, also we held the fear that the ice-cake under us might suddenly break up : we wanted a chance for our lives, hence the night patrol.

On the morning of June 5 the ice-wall pushed in upon our run-way. When we woke up out of our sleep the run-way was already destroyed. It was tough to be toiling over and over ; tougher to see the vengeful forces of Nature step in and finally crush, one after another, our efforts.

If we could but locate a floe of sufficient area for the plane to take off from !

On the morning of June 6, Riiser-Larsen and Omdal started off to hunt up such a floe. Into the fog they strode, were swallowed up. We saw no more of them until evening, when out of the fog they emerged, assumed clearer shape before us. We searched their faces eagerly for what we might find there. And we knew, even before they spoke, that it was good news they were bringing.

They had found a floe !

They had searched through the fog, stumbled over discouraging ridges, when suddenly the sun burst through a rift above them and shone upon the tip of a floe of

sufficient size. They hurried toward it, and found it, which proved to be all of four hundred metres across.

This life-saving floe was half a mile away, and there were two other floes between it and the floe we were camped on. It would be necessary to build a slip across these two floes and bridge the intervening leads of water.

We start the engines—it is now 7 p.m. We had to start them quickly. The main body of the pack had been moving down upon us—it was only ten yards away when the two patrols came in with the glowing report. Immediately behind the plane a huge ice-wall was slowly advancing.

Fifteen minutes after starting up the engines, the solid ice closed in over the spot where our plane had lain.

Once more we were saved—for the time. We worked our way slowly up to where we must begin to build the slip, sawing out the ice ahead where it was too heavy for the plane to break through.

After six hours of steady work we had constructed the slip and had our plane safe up on floe No. 1.

That night we slept, and next morning early began the stupendous task of cutting a passage through an ice-wall twelve feet thick which separated floe No. 1 from floe No. 2, and then of bridging between the floes, which were separated from one another by a fifteen-foot channel of water. It was a hard job for men working on a short emergency ration and with our meagre tools, but by the end of the second day the job was done.

Crossing the bridges between the floes was the exciting work. The heavier blocks which we used for our bridge foundation were floated into place in the sea and left to freeze into a solid mass, as we hoped, during the night. The sustaining capacity of such ice blocks could not be great—that we knew ; but we had to try them.

When the time came, we turned the engines on full

power and started across the ice-bridge at full speed. Our only chance lay in going full speed ; otherwise she would settle down and perhaps instantly stop on the other side where we had taken no time to level ahead—this because of our great fear that the ice-floes, if we delayed too long at our work, would drift further apart.

We made the passage ! We were at last upon the big floe !

It had not been all mere straightforward toil up to the big floe. We were on floe No. 1, working away in the night, when a strong wind set in from the south. Foreseeing all kinds of possible happenings, we began at once on the work of levelling a course for the plane across that floe, even though it was less than three hundred metres across—desperately short for a take-off for our heavy plane.

We levelled off and tried for the take-off, but the wind had again shifted and our plane could not make it. The snow, cloggy and wet from the south wind, stuck to the plane and clogged her speed. Our plane, be it remembered, was really a heavy flying-boat, with pontoons (or floats) on either side of the hull for landing on ice or in the sea. She bumped and slid along on the pontoons, unable to rise before open water was reached. We thereupon resumed and finished the work of getting her over the big floe, as already told.

It was June 9 when at last our plane lay safe upon the big floe. Now begins the long grind of constructing the course upon which our final hopes must rest. If we fail now, there is nothing left.

We look the ground over. There is two feet of snow covering the ice. We shall have to remove all that heavy wet snow right down to the solid ice and then cut out a track 400 metres long, and the heavy wet snow must be thrown clear to six metres on either side

so as not to interfere with the wing struts. After a few shovelfuls we stand weak and panting, and gaze disheartened at the work ahead. It may be worth while noting here that throughout all this terrible toil on half rations—emergency rations always—we felt at no time ravenously hungry; but we did have a feeling always of weakness. I have many a time felt much hungrier than I ever did on short rations up there in the Arctic, but never anything like so weak as we were then; and we knew we were growing weaker.

One problem was how to taxi our plane through the wet snow and turn it at our starting-point in the direction of our course; for as she lay, when first brought on to the big floe, she was pointed wrong. Even after we had dug down to the blue ice under the snow she would not turn, because with the removal of the blanket of snow the ice beneath became soggy and sticky. Fog rots ice rapidly.

We worked our skis underneath the plane in the hope that thus it would push more easily; but the weight of the plane split the skis, whereat we had to give over that idea. Without our skis we would be helpless if ever it came to getting ahead on foot!

By the end of the first day we had managed to clear 50 metres of our needful 400; that is, a path 160 feet or more long and 40 wide. After that first day we think of stamping down the snow with our feet and find that it serves the purpose admirably!

On that same first day of work on the big floe we saw our first sign of animal life since the seal had popped up from the ice-pack just after our first landing. Somebody looked up from his shovelling to see a little auk flying through the fog overhead. It came out of the north and was headed north-west. Next day two wild geese flopped down beside the plane. Dietrichson got

out the gun. Weary as they were, they should be an easy mark. We were already drooling at the thought of the luscious addition to our tabloid rations. Dietrichson loaded up, fired, and missed. The two geese ran across the snow and alighted again. By and by they flew off, heading north-west also. We wondered if there was any land somewhere in that north-west.

We started our second day's work on the big floe. I began to wonder this day if we were to make the great sacrifice for our venture. The outlook is hopeless. Summer is coming on, the snow is soft, and the lead won't open. The meagre rations and the prospect, the meagre tools we have to work with—it is a desperate outlook.

For four days now we have been stamping down the ice to smoothen it.

On June 14 our 400 metres course, as we suppose it to be, was to our liking. Then that ever-wakeful Riiser-Larsen paced the distance. "What's this!" he cries, and re-paces it. "Four hundred metres, no! It was 500 metres!" he exclaimed, whereupon Captain Amundsen remarks that not one million of dollars could buy that extra hundred metres from him. We all agree that it is priceless.

And so it proved to be.

On the evening of the 14th we drink our chocolate. There is a tail wind—we decide to make a try for it.

But the plane only bumped over the course. A speed of 100 kilometres (62 miles) was necessary for our plane to leave the ground. For four tries the best speed we can make is 40 kilometres. On our fifth try we make 60 kilometres. Riiser-Larsen, pulling up at the edge of the floe, turned in his seat and said to me, as I jump from my plane and stand on the ice :

"I hope you are not disappointed, Ellsworth. The

wind was against us. I think we'll do better next time."

Stout-hearted Riiser-Larsen, that calm, dispassionate embodiment of saving hope ! In his brain was born the great idea that we all get down on our hands and knees and with our sheath knives level off and smooth every little bump of ice we can find. We do that ; and also we decide to discard everything that can possibly be spared, even the empty petrol tanks, to lighten up the plane before we try again.

That night it was my watch all night. I travelled round and round the edge of the ice-floe on my skis, hoping against hope for signs of open water. Many times during the night I watched Riiser-Larsen draw himself up through the manhole in the top of the plane to see how the wind was blowing.

The wind changed during the night, and in the morning was blowing lightly from the north, the second time since our arrival on the ice. (We had landed in a north wind.) It was favourable for our take-off. The temperature was −1.5 C., the snow was crisp and hard on top.

We threw away everything, including our heavy ski-boots and parkas, and retained only half our remaining food supplies, as well as a canvas canoe and a shot-gun.

Before leaving home I had had a rifle with a Pope barrel especially made for me. It was a beautiful weapon, the one thing I really regretted leaving behind.

We all take our seats, and the great moment comes. The plane begins to move. The wind was from the north, the first north wind since we landed. This wind was in our favour. Riiser-Larsen begins to smile. She has gone a hundred, two hundred, three hundred metres with constantly increasing speed—Riiser-Larsen's smile widens. Four hundred metres she has gone, the end

of the floe is there right before her. Are we going into the air or merely crash over into the lead? But her speed is now one hundred kilometres, and she is lifting, lifting. She stays lifted.

We are off! It was a great moment when we look down and back and see that we are clear.

It took us two hours to fly through the fog. We could get neither above nor below it. During this two hours we flew solely by magnetic compass—a thing generally considered to be an impossibility in the Arctic.

Dietrichson drops down for a drift observation as frequently as possible. As the fog still hangs low, he has to fly close down to the floe—only a hundred feet up above it for a time. Finally we rise above the fog, and from then on we steer by sun-compass.

We are southward bound, homeward bound, back to where people live. I am sitting in the tail of the plane. We have been flying for more than seven hours, when Feucht looks back to me. "Land!" he shouts.

"Spitzbergen?" I ask.

"No Spitzbergen," he answers, in his imperfect English.

I wonder if it is Franz Josef Land, without caring overmuch just what land it is. It is land, and any land is good. My immediate thought, everybody's immediate thought, is that all rationing regulations are off, and we may eat all we please. We all start in munching chocolate and biscuits.

Riiser-Larsen had been noticing that the stabilization rudders were becoming more and more difficult to operate. Finally they failed completely to move, and we are forced to descend a mile from the coast in a sea that is running fairly high. The waves wash over the plane, thoroughly drenching the pilot, compelling us all to seek shelter below.

Before we left we planted our Norwegian Flag.

I had eaten too freely of our rations before descending and it was my first solid food in nearly a month. My stomach rebelled ; I became violently ill.

We had been flying eight hours and thirty-five minutes, and had just 90 litres of petrol left, half an hour's supply of fuel, when we landed in that rough sea.

How remarkable all our escapes were ! Again and again it looked as if life or death, we not knowing which, lay right beyond the hour. Said Captain Amundsen, " You can call it luck if you want, but I don't believe it."

In we came, in the wash of the wind-whipped tide :

> " Overloaded, undermanned, meant to founder, we
> Euchred God Almighty's storm, bluffed the Eternal Sea ! "

How good that land looked again. The warm sun was shining on the rocks. I picked out a flat granite boulder and stretched out face up to the sky, as did all the others.

By and by we got out our sextant to find out just where we were. We were at that work when someone yelled : " A sail ! "

It was a little sealer heading out to sea. We yelled, we waved our flags ; she continued on her way to the open sea.

We were not going to let her get away. We jumped into our plane and taxied out to her. She was a little sealer and her name the *Sjöliv*, and she had been chasing a wounded walrus that had taken refuge in our bay. It was lucky for us, that pursuit of the wounded walrus ; otherwise she and her crew would have been away long ago.

They were overjoyed to see us.

Three days later we landed back in King's Bay.

We tried to tow our plane, but because of the heavy

wind we had to leave her in Brandy Bay in Northeastland, Spitzbergen. Later we returned with sufficient fuel to fly her the hundred miles to King's Bay.

We placed the N.25 on a steamer and on June 25th sailed from King's Bay for Norway. We landed at Horten, which is the naval base near Oslo.

On July 5th, the stage being all set for us, we flew the N.25 into Oslo. It was hard to realize that this plane under us was the same that had so lately been battling the Arctic ice. Good old N.25 !

Of all the incidents of our polar trip, the homage accorded us upon our return to civilization will be what I shall remember longest.

We dropped down into the fjord and taxied past shrieking frantic river craft, through waving, cheering throngs, past a fleet of thirteen British warships, fully manned. Guns boomed from the fort ashore. I listened to the booming guns, I stared ahead at the great multitude, the silent, expectant shore mass of humanity that was yet to greet us, and it was too much for me. Tears rolled down my face. At that moment I felt repaid in full for all that I had gone through.

LINCOLN ELLSWORTH.

THE END

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